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ABSTRACT

This document, which lists the horticultural-agricultural technologies competencies identified by representatives from business, industry, and labor as well as educators throughout Ohio, is intended to assist individuals and organizations in developing college tech prep programs that will prepare students from secondary through post-secondary associate degree programs for employment as Landscape Designer/Manager Landscape Technicians; Golf Course Maintenance Technicians; Lawn Care Specialist/Technicians; Tree Maintenance Technician/Arborists; Nursery Technicians; Floral Designers; Agricultural Custom Applicators; Agricultural Crop Consultants; and Greenhouse Technician/Managers. The competencies, which are separated into essential competencies needed to ensure a minimal level of employability and recommended competencies, are organized by instructional units and include suggestions as to when students should be introduced to, reinforced, and proficient at them. The included Technical Competency Profile (TCP) matrix includes a list of 29 technical competencies that are required or recommended for the different types of employment listed above. Some of the common competencies are as follows: plant science; workplace safety; basic accounting; daily management tasks; supervision; sales and marketing; horticulture fundamentals; horticultural plant health care; equipment maintenance; soil science and management; and environmental science and ethics. Includes a list of TCP panel members. (MO)

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ED 479 725

Horticulture-Agriculture Technologies

State Competency Profile

December 7, 1998
Columbus, Ohio

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Horticulture/Agriculture Technologies
State Competency Profile Meeting
December 7, 1998

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Horticulture/Agriculture Technologies
State Competency Profile Meeting
December 7, 1998

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Horticulture/Agriculture Greenhouse Technologies
State Competency Profile Meeting
June 29, 1999

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OCCUPATIONAL DEFINITIONS

Horticulture-Agriculture Technologies

Landscape Designer/Manager – Landscape Technician
An individual who applies horticultural engineering and architectural principles to develop residential, commercial, and/or recreational environments which are both functional and beautiful and seeks Pesticide Applicator Certification. Technical skills should include, but not be limited to:

- plant identification, selection, and culture
- drafting
- equipment maintenance and operation
- landscape contracting
- landscape construction
- landscape design
- precision agriculture
- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management

Golf Course Maintenance Technician
An individual who applies horticultural principles and business skills in managing a golf course. Technical skills should include, but not be limited to:

- turf selection and management
- irrigation and drainage
- care of trees, shrubs and flowers
- operation of equipment
- repair of equipment
- golf course organization/set-up
- design concepts and renovation
- golf course maintenance
- business management.

- building/facility maintenance
- knowledge of game of golf
- precision agriculture
- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management

Lawn Care Specialist/Technician
An individual who applies horticultural principles and business skills to install, manage, and maintain lawns, athletic fields, or other turf areas. Technical skills should include, but not be limited to:

- grass/cultivar selection
- turf identification
- installation of turf areas
- maintenance of turf areas
- fertilization of turf areas
- irrigation and drainage
- aeration methods
- equipment operation and maintenance
- knowledge of environmental impact of lawn pesticides and fertilizers
- precision agriculture
- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management

Tree Maintenance Technician/Arborist
An individual who applies horticultural principles and business skills to residential, commercial, governmental, and utility tree care. Technical skills should include, but not be limited to:

- tree selection
- transplanting trees
- pruning trees
- fertilizing trees
- tree removal
- lightning protection
- cabling and bracing of trees
- operation and maintenance of equipment
- identification of plant
- precision agriculture
- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management

Nursery Technician
An individual who applies horticultural principles and business skills in nurseries, garden centers, arboretums, and botanical gardens and seeks to be a Certified Nursery Technician. Technical skills should include, but not be limited to:

- identification of plants
- plant production
- propagation
- plant culture
- equipment operation and maintenance
- soil sampling and analysis
- drainage and irrigation
- pruning
- inventory control
- safe chemical handling
- precision agriculture
- safety regulations

- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management

Floral Designer

An individual who applies horticultural and artistic principles with business skills to design fresh and artificial arrangements. Technical skills should include, but not be limited to:

- identification of flowers and their care requirements
- handling of flowers and greens
- handling and use of pot plants
- floral arrangements
- decorative use of foliage
- management
- design
- safety regulations
- safety regulations
- customer sales and services
- computer skills
- supervision
- record keeping and laws

Agricultural Custom Applicator

An individual who applies knowledge of agricultural principles of fertilization and pesticides to aid in the production of crops and seeks to be a Certified Crop Advisor (CCA). Technical skills should include, but not be limited:

- soil sampling
- identification of plant nutrient needs
- fertilization of crops
- equipment maintenance and operation
- knowledge of environmental impact of application of agricultural pesticides and fertilizers
- emergency first aid
- precision agriculture

- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management

Agricultural Crop Consultant
An individual who applies agricultural principles to aid farmers and other production agriculturalists and seeks to be a Certified Crop Advisor (CCA). Technical skills should include, but not be limited to:

- field evaluation
- knowledge of crop management
- crop selection
- soil sampling and analysis
- soil management and conservation
- crop inspection
- fertilization of crops
- marketing and sales
- knowledge of environmental impact of agricultural practices
- application of agricultural chemicals
- safe chemical handling
- precision agriculture
- safety regulations
- application of pesticides and fertilizers
- customer sales and services
- computer skills
- supervision
- record keeping and laws
- basic soil and plant science
- pest identification and management

Greenhouse Technician/Manager

An individual who applies horticultural and business principles in all areas of greenhouse production, as well as in sales, service, and consulting. Technical skills should include, but not be limited to:

- identification of plants
- plant production
- plant propagation
- fertilization
- pruning
- pest and pathogen management
- greenhouse environmental control
- harvesting, handling and use of pot plants, bedding plants, foliage, cut flowers, vegetables, hanging baskets, and perennials
- greenhouse equipment maintenance
- marketing and sales
- greenhouse construction
- communication skills

LEVELING CODES

GRADE LEVEL

12 = by the end of grade 12

AD = by the end of the Associate Degree

DEPTH

I = Introduce (applies to at least three or 25% of the competency builders)

R = Reinforce or add depth (after introducing or proficiency)

P = Proficient (achievement of the competency **without** supervision)

OTHER (Determined by Business, Industry and Labor Panel)

Essential Competency: Competency is needed to ensure **minimal** level of employability. Entry level employees should be able to perform this competency without supervision. Competencies required for certification, licensure, and/or national skills standards should be tagged as essential.

Recommended Competency: Competency should be included but is not essential for minimal level of employability.

Delete: Competency should not be included.

Example:

BIL: Essential Recommended Delete

	12	AD	AC
EDU	P	R	

Competency: XXXXXXX

Example:

BIL: Essential Recommended Delete

	12	AD	AC
EDU	P	R	

Competency: YYYYYYY

Competency Builders:

SSS

XXX

Horticulture-Agriculture Technologies
Tech Prep Competency Profile

Matrix

LD=	Landscape Designer/Manager – Landscape Technician
GS=	Golf Course Superintendent – Golf Course/Grounds Maintenance Technician
LC=	Lawn Care Specialist/Technician
TM=	Tree Maintenance Technician
NT=	Nursery Technician
FD=	Floral Designer/Manager
CA=	Agricultural Custom Applicator
CC=	Agricultural Crop Consultant
GT=	Greenhouse Technician/Manager

Page	Unit	LD	GS	LC	TM	NT	FD	CA	CC	GT
1	Plant Science	X[1]	X	X	X	X		X	X	X
14	Workplace Safety	X	X	X	X	X	X	X	X	X
17	Basic Accounting	X	X	X	X	X	X	X	X	X
19	Daily Management Tasks	X	X	X	X		X	X	X	X
21	Supervision	X	X	X	R[2]	R	R			X
25	Sales and Marketing	X		X			X		X	X
35	Horticulture Fundamentals	X	X	X	X	X				X
39	Horticultural Plant Health Care	X	X	X	X	X				X
49	Equipment Maintenance	X	X	X	X	X		X		O
65	Landscape Technology	X	X	X						
70	Turf and Landscape Operations	X	X	X						
80	Nursery Production Management					X				
90	Irrigation	R	X	R		X				X
92	Landscape Design	X	R	R						
115	Drafting Technology	X	R							
121	Computer Aided Design Fundamentals	X								
125	Arboriculture	X	X		X	O[3]				
140	Landscape Construction	X	R							
149	Golf Course Operations		X							
156	Turfgrass Management for Golf Courses		X							
162	Nursery Operations					X				
172	Floral Design						X			
186	Soil Science and Management	X	X	X				X	X	R
201	Environmental Science and Ethics	X	X	X	X	X	X	X	X	R
216	Crop Pest Identification and Management							X	X	X
226	Fertilization of Crops							X	X	X
233	Crop Production								X	
248	Agricultural Business Management and Marketing							X	X	X
264	Greenhouse Management									X

[1] X = Unit required

[2] R = Recommended only

[3] O = Some competencies, not applicable

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Unit: Plant Science

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Demonstrate general knowledge of plant anatomy

Competency Builders:

List the parts of the plant and their functions including: seed (embryo, cotyledon, coat), root, modified stems (tuber, rhizome, stolon, corm, bulb) stem (xylem, phloem, pith, cambium), leaf (blade, lobe, auricle, ligule), meristem (apical, dominant, terminal, auxiliary bud), and flowers (petals, corolla, sepals, calyx, bracts, anther, stamen, style, ovary)

Identify the major components of cells

Identify different types of root cells, where they are found in the root and what function they serve

Identify different types of stem cells, where they are found in the stem and what function they serve

Identify different types of leaf cells, where they are found in the leaf and what function they serve

Identify differences between meristematic tissue and differentiated tissue

Explain the function of the major tissue systems and how they are arranged in plant organs

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Identify different types of sexual and asexual reproduction

Competency Builders:

Identify the male and female flower parts as well as non-sexual flower parts and their modifications

Identify the parts of a seed

Identify the environmental influences on seeds that are critical for germination

Explain the pollination process and factors that contribute to success

Analyze germination results from seeds using different seeds and media

Identify advantages of utilizing hybrid seeds

Identify factors that affect germination percentage

Explain the differences between the basic process of asexual growth and sexual cell development

Explain the process of propagating plant material by crown division; layering; and rhizomes and stolons

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Identify genetic principles and terminology**

Competency Builders:

Identify major steps or phases of mitosis
Identify major steps or phases of meiosis
Explain the similarities and differences between mitosis and meiosis
Explain dominant and recessive gene characteristics
Explain homozygous and heterozygous gene characteristics
Identify difference between genotype and phenotype
Describe the possible impact of genetic engineering on plant improvement
Describe possible applications of genetic engineering and gene splicing on pest control

BIL: Essential

EDU:	12	AD	AC
	1	P	

Competency: Classify plants

Competency Builders:

Describe the functions of plants (e.g., food, feed, fiber, soil, wood, recreation, erosion control, nutrient recycling, medicinal, industrial-dyes, chemicals)

Describe the basis for plant classification

Identify the components of the binomial system of nomenclature

Identify the life cycle conditions necessary to classify a plant as an annual, a biennial, or a perennial

Classify living plant seeds or reproductive structures according to life cycle

Identify basic plant biological classification units (i.e., family, order, class, division, genus, species)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Explain plant metabolism and physiology**

Competency Builders:

Identify components of photosynthesis processes in plants
Identify plant pigments
Explain the importance of plant pigments to photosynthesis
Identify different color patterns found in plant leaves
Describe the effect of different color patterns found in plant leaves on photosynthesis
Outline the respiratory process
Explain the inter-relationship between the respiratory process and photosynthesis and plant growth
Contrast transpiration and evaporation
Explain the use of water within the plant

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate knowledge of plant growth and development**

Competency Builders:

List micro or macro nutrients

Classify micro or macro nutrients

Describe the process of water uptake and use in plants

Explain the effects of light intensity, quality and duration on plant growth

Explain the concept of plant hardiness and the classification based upon minimum temperature tolerance

Explain the effect of temperature on growth rate, life cycle, seed viability, and germination as well as plant reproduction

Identify major classes of chemical/hormonal growth regulators and their functions

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Explain plant nutrition and fertilization**

Competency builders:

Define available nutrients, leaching, element, organic fertilizer and inorganic fertilizer

Identify the primary elements and their functions in plant growth

Identify deficiencies caused by the lack of the minor elements

Differentiate between organic and inorganic fertilizers

Describe the advantages and disadvantages of organic versus inorganic fertilizers

Describe the hazards associated with over fertilization

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Identify environmental factors affecting plants**

Competency Builders:
Describe external influences on plant growth
Explain photoperiodism and dormancy in plants
Describe affects of plant hormones
Explain the commercial uses of auxins
List optimum growth conditions for different types of plants
Describe the influence of day length on plant growth
Explain how the cycle of the seasons influences plant growth

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Explain how to improve plant seed quality

Competency Builders:

Define heredity, genetics, inbreeding, crossing, progeny, self-fertilization, cross fertilization, mutation, hybrid, systemic pesticide, toxic, and vigor
Explain seed development, morphology, and composition
List the characteristics of good seeds
Describes the factors which create poor seed quality
Describe the history of plant improvement
List major aims of plant breeders
Describe three methods of plant improvement
Identify state agency responsible for seed certification
Describe major points and economic aspects to consider when identifying varieties for planting
Explain the danger of monogenetic type crops (e.g., southern corn blight)
Describe the possible impact of genetic engineering
Describe breeding for pest resistance (e.g., insects, nematodes, and diseases)
Describe the classes of seeds (e.g., breeders, registered, certified)
Differentiate between hybrid seed and seeds from open pollinated or self-fed plants
Explain how "hard seeds coat" can be used to maintain high quality seed
Explain why plant breeding take several years
Explain why breeders have to constantly be developing improved varieties

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Describe plant diseases**

Competency Builders:

Define microorganism, pathogens, symptoms, day length, wilt, mosaic, blight, curl, dwarfing, gall, mildew, rot, smut, and disease
Identify major causes of plant disease
Describe the symptoms and effects of major diseases on major agricultural/horticultural crops
Identify several methods by which diseases are transmitted in plants
Explain Koch's Postulates and their use in determining primary and secondary pathogens
Explain how fungi attack plants
Describe the typical structure and function of fungi
Describe the life cycle of wheat rust and potato blight
Differentiate between a saprophyte and a parasite
Explain how some fungi are helpful to plants
Explain how fungi are classified
Explain how bacteria are classified
Explain that bacteria affect their host using exotoxins or endotoxins
Explain that the ability of bacteria to reproduce by fission makes them dangerous
Explain how viruses are noncellular pathogens that use the cell's DNA or RNA to reproduce
Explain how viruses are classified by their host
Describe the lytic cycle of a virus
Identify environmental conditions that favor or hinder disease development

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Explain management of plant diseases

Competency Builders:

Define damping off, fumigant, fungicide, resistance, sprays, dust, volatile, crop rotation and sanitation

Explain the "disease triangle"

Describe cultural practices that may be used to prevent plant diseases

Describe the impact of genetic engineering on control of plant diseases

Explain how chemicals manage diseases

Explain how genetic resistance reduces production costs and potential environmental impact from spraying

Explain the economic importance of managing plant diseases

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Explain weed management**

Competency Builders:

List ways weeds spread
List reasons weeds are harmful
List methods of weed management
Explain mode of action of common herbicides
Explain weed resistance to herbicides
Describe possible applications of genetic engineering and gene splicing to weed control
Explain how herbicides kill weeds
Identify the major weed species and explain options available for managing each

BIL: Essential

EDU:	12	AD	AC
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Competency: **Explain moisture control**

Competency Builders:
Define irrigation, mulch, organic matter, runoff, seepage, subsoiling, and tillage
List three methods of moisture control
List the cultural practices used in moisture control (i.e., annually and at planting)
Describe importance of internal and external drainage in soils
Describe importance of irrigation to plants
Describe the methods of irrigation (e.g., drip, furrow, sprinkler, flood)
Explain the hydrologic cycle
Explain how irrigation causes salinity problems
Explain salt water intrusion in irrigation wells
Explain subsidence caused by removal of irrigation water
Describe methods used to reduce irrigation water loss
Explain the use of tensiometers and moisture meters
Explain irrigation scheduling

Unit: Workplace Safety

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Demonstrate safe work habits

Competency Builders:

Wear protective clothing and equipment, including eye and ear protection as required

Interpret information on signs and labels

Explain why safety equipment and personal protective equipment are necessary, including cost and consequences

Check working condition of safety equipment and personal protective equipment (e.g., physically, listening)

Report malfunctioning safety equipment and personal protective equipment

Observe safety precautions when handling chemicals or fertilizers

Follow personal cleanup procedures after handling chemicals and fertilizer

Interpret hazardous materials notices

Recognize the existence of hazardous materials, their use and disposal procedures according to government regulations (e.g., fertilizers, mulch, gasoline)

Explain why wastewater must be disposed of safely

Identify safety problems within work environment (e.g., loose wiring, broken concrete, slippery surfaces)

Pay attention to safety as you work (i.e., don't create safety problems that are not there)

Explain why safety problems and corrective measures are important (e.g., focus on loss of time, money, energy)

Differentiate safety as it relates to customer vs. employees

BIL: Essential

EDU:	12	AD	AC
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Competency: **Maintain safe work environment**

Competency Builders:

Maintain clean and safe work area
Identify hazards presented by hazardous materials
Identify hazardous materials and location of Material Safety Data Sheets (MSDS), including comparative hazards
Follow MSDS safety information and "Right-to-Know" legislation
Comply with shop and equipment safety rules
Follow environmental and safety issues pertaining to the Environmental Protection Agency (EPA), Food and Drug Administration, OSHA, and/or other state and federal regulations
Report safety hazards and accidents to supervisor immediately
Complete detailed accident report and explain the consequences
Identify why safety devices are important, and the consequences of their absence
Maintain safety devices
Comply with general - use and restricted - use product regulations
Recognize safety hazards at each work site (e.g., trees, underground utilities)
Minimize risks associated with safety hazards
Monitor regulation updates
Follow government regulations and restrictions
Apply fire safety rules and procedures
Apply basic knowledge of first aid and CPR when necessary

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: Operate equipment safely

Competency Builders:
Follow safety rules for equipment operation and maintenance
Comply with safety zones around equipment
Operate eqiupment defensively
Interpret safety symbols
Use slow - moving - vehicle signs when operating vehicles on road
Keep riders off mobile equipment
Maintain safety shields on all equipment
Shut down power equipment before servicing
Report potential equipment safety hazards
Follow manufacturer's service recommendations
Maintain valid driver's license
Perform lockout and tagout
Identify equipment safety issues

Unit: Basic Accounting

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Use arithmetical skills for accounting**

Competency Builders:
Compute cash discounts for various terms
Compute extension, sales tax, and totals of sales slips

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Identify accounting principles**

Competency Builders:
Identify basic accounting principles
Identify basic accounting applications
Explain use of record keeping in relation to business and economical applications
Prepare budgets
Prepare comparative (actual vs. budget) income statement
Define cost accounting, direct materials, direct labor and overhead
Calculate depreciation
Complete a profit and loss statement

Unit: Daily Management Tasks

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Perform general office duties

Competency Builders:
Use office machines
Plan work schedules
Operate computer
Maintain organized work area
Take proper notes
Communicate messages properly

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Order merchandise

Competency Builders:
Identify when to order particular merchandise
Identify where to order particular merchandise
Identify how to order particular merchandise
Identify how much merchandise to order
Outline amount of storage needed
Use price lists and catalogs

Unit: Supervision

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate human resource skills**

Competency Builders:
Apply interview skills
Apply appropriate management and leadership styles
Display managerial and supervisory skills
Apply human relations skills
Communicate performance expectations
Adhere to company policies regarding discrimination and harassment
Document personnel issues
Recognize legal requirements of employee and employer relations
Display team building skills

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Manage human resources**

Competency Builders:
Use foresight to anticipate and manage change
Discipline employees
Counsel employees (e.g., career objectives)
Dismiss employees
Maintain performance records
Address employees regarding disciplinary action
Recommend employee for promotion
Explain procedure for handling grievances
Evaluate employee performance

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Manage work flow**

Competency Builders:
Communicate operating policies and procedures
Meet production standards
Interface with other departments/crews
Prioritize work
Assign work to other crew members
Delegate work
Provide instructions
Monitor progress
Complete productivity reports
Complete managerial reports
Maintain appropriate work environment
Troubleshoot operational problems
Complete assigned tasks in a timely manner
Coordinate with team members

BIL: Recommended

EDU:	12	AD	AC
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Competency: Manage projects

Competency Builders:
Develop strategic plan
Develop project budget
Schedule work assignments
Apply quality measures and counter measures

Unit: Sales and Marketing

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: Promote company image

Competency Builders:
Explain importance of image
Identify factors affecting image, positive and negative
Project company image
Exhibit good personal hygiene
Perform quality work
Follow instructions and uniformity
Keep equipment clean
Follow dress code
Handle customer complaints
Communicate positively with customers
Read company manual
Maintain continuity and uniformity of company logo
Follow customer awareness programs

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Demonstrate presale skills**

Competency Builders:
Maintain product and service knowledge
Differentiate between product features and product benefits
Examine types of selling techniques
Identify types of customers
Identify customer buying motives and signals
Maintain prospective customer relationship

BIL: Recommended

EDU:	12	AD	AC
		I	

Competency: **Demonstrate post sale skills**

Competency Builders:
Compose personal appreciation notes
Follow up purchases and sales
Develop repeat customer contact list
Add customer to annual mailings
Develop a follow-up file
Demonstrate seasonal greetings

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Conduct sale**

Competency Builders:
Greet customers
Use appropriate questioning techniques
Use appropriate selling techniques
Identify customer needs, problems and recommendations
Describe services and expectations
Explain extent of guarantee
Access support services
Close sale
Use good telephone skills
Compute taxes
Record sales information
Utilize product demonstrations, exhibits, and displays
Address customer complaints
Resolve customer complaints
Process tax exempt sales transactions
Process charge account sales transaction
Process charge card sales transaction
Calculate customer discount
Wrap purchases
Handle special orders

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Prepare estimate**

Competency Builders:
Calculate square footage and cubic yards
Use price list
Estimate total amount of materials needed
Estimate fixed costs

BIL: Recommended

EDU:	12	AD	AC
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Competency: Advertise products and services

Competency Builders:
Identify products and services to be presented
Identify opportunities for publicity
Implement presentation
Prepare advertising materials
Implement product demonstrations, exhibits, and displays
Select signs
Arrange retail area according to season

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Maintain price lists and catalogs**

Competency Builders:
Compare prices of similar products and services
Outline material and service availability
Keep product and service catalogs current
Keep profit and loss in line

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Price merchandise/service**

Competency Builders:
Estimate fixed and variable expenses
Calculate markup
Calculate break-even point
Compare pricing strategies
Identify factors affecting pricing
Price merchandise
Prepare merchandise for inventory or display
Use computerized pricing systems
Attach price tags

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Display merchandise**

Competency Builders:
Design displays
Set up displays
Select items for display
Use props
Identify display areas

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Provide technical assistance**

Competency Builders:
Provide customer with informative materials
Interpret product labels
Provide care and safety instructions
Demonstrate product use
Explain safety precautions regarding product use or application
Outline extent of product guarantee
Address customer complaints
Identify when merchandise is to be delivered
Provide specialized care instructions

Unit: Horticulture Fundamentals

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Demonstrate knowledge of the horticulture industry

Competency Builders:
Identify fields of endeavor within the horticulture industry
Describe economic importance of the horticulture industry
Describe environmental importance of the horticulture industry
Identify employment opportunities within the horticulture industry
Identify regulatory aspects of the horticulture industry
Identify continuing education opportunities within the horticulture industry
Identify professional organizations within the horticulture industry

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Identify plants

Competency Builders:

Classify plants as monocots or dicots
Identify plants using scientific and common name
Spell and pronounce using scientific and common name
Classify plants as annuals, biennials, and perennials
List environmental preference of plants (e.g., shade, sun, wind, moisture, soil conditions)
Classify plants according to growth habit

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Demonstrate pruning skills

Competency Builders:
Identify methods of pruning plants to achieve desired growth
Select proper pruning tools for the task
Identify appropriate time to prune plants
Explain root pruning appropriate plants
Prune plants for desired shape and growth
Identify means of sterilizing pruning tools
Distinguish between proper pruning and shearing
Develop proper pruning equipment maintenance (e.g., schedule repair)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Keep records

Competency Builders:
Keep fertilizer and pesticide application records
Keep equipment maintenance and service records
Keep job records and daily log sheets
Keep inventory records

Unit: Horticultural Plant Health Care

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Make proper plant selection

Competency Builders:
Identify plants appropriate to a region
List environmental preference of plants (e.g., shade, sun, wind, moisture)
Classify plants according to growth habit
Match tree and planting site
Describe installation
Perform planting and transplanting
Describe proper care after planting
Identify disease-resistant and insect-resistant species/cultivars

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate knowledge of cultural practices**

Competency Builders:

Demonstrate knowledge of soils

Demonstrate knowledge of soil, water, air relationship, temperature, light and fertilizer

Explain methods of plant-water management

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Explain knowledge of irrigation and drainage**

Competency Builders:
Explain methods of aerification and vertical mulching
Explain irrigation procedures
Explain aerification procedures
Explain drainage procedures
Explain importance of mulch (e.g., air, water, temperature, nutrients)
Identify types of mulching materials
Demonstrate proper mulching techniques

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Manage pests**

Competency Builders:

Classify insects according to feeding habits
Identify common insects, weeds, and diseases of plants
Describe life cycle of insect pests, weeds and diseases
Describe methods (i.e., biological, chemical, and cultural) of managing plant insects, weeds and diseases
Report insect, weeds and disease damage for proper control measures
Interpret information on a pesticide/agricultural chemical label
Interpret spray compatibility charts
Select pesticides according to the product label
Simulate mixing of pesticides according to the product label
Apply fundamentals of IPM
Simulate application of pesticides according to the product label
Clean spray equipment
Calibrate spray equipment
Dispose of pesticide containers in compliance with local, state, federal, and EPA regulations
Maintain pesticides records
Describe symptoms of pesticide poisoning and identify first aid required
Select pesticide according to controlling action (e.g., stomach, contact, systemic)
Identify chemical injury to plants
Take pesticide applicator test

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Manage pests in trees and shrubs**

Competency Builders:
Select the proper pesticide
Identify coverage and coverage requirements
Prepare pesticide solutions
Adjust sprayers
Operate sprayers
Simulate spraying of prescribed area safely
Clean sprayers
Repair sprayers

BIL: Essential

EDU:	12	AD	AC
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Competency: **Implement integrated pest management (IPM) program**

Competency Builders:
Follow general safety precautions
Identify insects, diseases, weeds, and vertebrate pests
Identify pest damage
Calculate area to be covered
Complete certification requirements for prescribed chemical application
Evaluate chemical/cultural/biological control options
Interpret chemical labels and compatibility charts
Identify appropriate methods
Estimate pest population numbers
Assess degree of damage
Outline when management is needed
Map chemical application, methods, and results
Document chemical application, methods, and results
Compute treatment costs
Recognize environmental limitations
Select options

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Identify tree and shrub pests**

Competency Builders:
Differentiate chewing, sucking, boring, and rasping insects
Differentiate bacterial, viral, and fungal diseases
Explain preventative measures to protect trees and shrubs from injuries

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Diagnose and treat plant problems**

Competency Builders:
Demonstrate the diagnostic process
Explain tree "stress" and the "healthy" tree
Identify common insects and diseases
Identify physiological disorders and injuries
Describe prevention treatment and continued health care
Demonstrate methods of applying fertilizer to trees and shrubs
Identify abiotic problems (e.g., weedeater, mechanical, paving damage)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate proper pruning practices as related to plant health care**

Competency Builders:
Identify dead, diseased, and dying branches and plants
Demonstrate proper pruning/removal techniques
Demonstrate importance of maintaining natural growth habit of plants
Explain importance of timing as related to pruning, mowing, etc.
Demonstrate accepted industry standards

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Apply fertilizers

Competency Builders:
Identify soil and media materials
Identify types and kinds of fertilizers
Identify methods of distributing fertilizers
Interpret information on tag or container
Identify symptoms of nutritional deficiencies of plants
Collect a soil sample for soil analysis
Identify fertilization requirements of plant materials
Set a fertilizer schedule
Apply fertilizer and soil amendments
Apply special fertilization methods appropriate to a region/plant group
Describe symptoms of fertilizer burn
Clean fertilizer application unit
Maintain fertilization records

Unit: Equipment Maintenance

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Maintain equipment

Competency Builders:
Follow general safety precautions
Calibrate equipment
Adjust belts
Adjust chains
Inspect assembled equipment for operating defects
Lubricate parts
Sharpen equipment
Maintain service records
Establish a preventative maintenance program

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Maintain engine cooling systems**

Competency Builders:
Follow general safety precautions
Test coolant mixture
Adjust or replace fan belt
Replace hoses
Inspect for leaks
Add coolant
Flush cooling system
Dispose of coolant and containers safely

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Service engine lubricant systems**

Competency Builders:
Follow general safety precautions
Check oil level
Select oil
Change oil and oil filters
Maintain grease fittings
Replace grease fittings
Grease or oil joints
Dispose of oil and containers safely

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Maintain small-engine fuel and air systems**

Competency Builders:
Follow general safety precautions
Service air cleaner
Bleed diesel fuel system
Mix gas and oil for two-cycle engine
Service crankcase ventilation components
Clean carburetor
Adjust carburetor
Service fuel filter assembly
Replace exhaust system components
Add proper fuel

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Maintain small-engine electrical systems**

Competency Builders:
Follow general safety precautions
Replace spark plugs and wires
Clean spark plugs
Adjust spark plug gap
Check specific gravity of battery
Install battery
Clean battery terminals, cables, and battery box
Charge battery
Replace fuses and light bulbs

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Service wheels and tires**

Competency Builders:
Follow general safety precautions
Inspect tires
Check tire pressure
Inflate tires
Tighten lug nuts
Replace flat tires
Rotate tires
Check valve stems
Patch tubes

BIL: Essential

EDU:	J2	AD	AC
	P	R	

Competency: **Maintain hydraulic systems**

Competency Builders:
Follow general safety precautions
Inspect system for oil leaks
Clean couplings
Inspect hoses
Identify proper reservoir
Check oil
Add oil
Replace oil filter
Dispose of hydraulic fluids safely
Bleed air from system
Replace hoses

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Perform predeparture functions**

Competency Builders:
Follow general safety precautions
Connect front-end-operated equipment
Connect 3-point-hitch equipment
Attach power takeoff equipment
Detach power takeoff equipment
Hitch towed equipment
Connect hydraulic lines
Connect electrical hookups
Connect safety chains
Refuel power units
Inspect working condition of lights
Check fluid levels
Secure all equipment and materials
Check tires and tire pressure
Check mirrors
Maintain service schedule
Check prestart mechanism
Flag extended materials
Inspect belts
Adjust belts
Add coolant
Inspect for leaks
Service air cleaner
Mix gas and oil for two-cycle engine
Label fuel containers properly

BIL: Recommended
(BIL strongly recommends that this competency be addressed)

EDU:	12	AD	AC
	I	R	

Competency: Operate equipment and vehicles

Competency Builders:
Follow general safety precautions
Adjust throttle for operating conditions
Interpret equipment gauges
Start engine
Shut down engine
Use hand operating signals
Operate manual transmission
Preheat diesels
Secure vehicle when parked
Operate automatic transmission
Use brake systems
Adjust seating and steering
Set out safety markers
Flag extended materials
Operate liftgates
Operate dump beds
Operate winch
Operate snowplow
Operate utility vehicles
Obtain driver's license
Operate aerial lift
Jump-start vehicle

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Operate power equipment as required

Competency Builders:
Follow general safety precautions
Use and calibrate equipment/spray equipment
Use rotary tiller
Use edger
Use blower
Use aerator
Use roller
Use mowing equipment
Use trimming equipment
Use lawn sweepers
Use sod cutter
Use chain saw
Use verticutter/turf groomers
Use tractor
Use and calibrate spray equipment
Use power washer
Use straw blowers
Use hand-held augers
Use power tamps
Use skid loader
Use trencher
Use backhoe
Use hydroseeders/mulchers
Use chippers
Use tree spade
Use cutoff saws
Use landscape rake
Use hydraulic tools

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Clean and store equipment**

Competency Builders:
Follow general safety precautions
Remove debris from equipment
Use steam or high-pressure wash equipment
Prepare engines for storage
Lubricate equipment for storage
Drain pumping system

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Use hand, power, and pneumatic tools**

Competency Builders:
Follow general safety precautions
Identify tools needed for job/task
Select tools according to job/task
Set up tools
Adjust tools
Clean tools
Lubricate tools
Recondition tools
Sharpen tools
Store tools

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Apply protective coatings

Competency Builders:
Follow general safety precautions
Clean surface
Sand surface
Apply masking tape
Thin paint
Mix primer coat
Apply primer coat
Apply wood preservative
Use steam and high-pressure wash equipment
Identify types of coatings
Use environmentally safe preservative

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Maintain application equipment

Competency Builders:
Follow general safety precautions
Lubricate spreader
Dispose of waste safely
Calibrate spreader
Clean blade propeller

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Weld with gas

Competency Builders:
Follow general safety precautions
Set up gas welding equipment
Adjust gas welding equipment
Select rod
Apply flux
Cut metal
Weld steel in horizontal positions
Weld steel with filler rod
Braze metal
Clean equipment
Store gas cylinders safely

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Weld with electric arc

Competency Builders:
Follow general safety precautions
Select welding equipment and accessories
Select electrode sizes and types
Select settings
Prepare metal
Weld steel in non-horizontal positions
Weld steel in horizontal positions
Weld pipe
Cut metal
Store equipment

Unit: Landscape Technology

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Prepare estimate and contracts

Competency Builders:
List materials required for the project
Identify equipment needs
Estimate time and man hours
Outline costs of materials, equipment, and labor
Prepare price for customer based on specifications

BIL: Essential

EDU:	12	AD	AC
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Competency: Organize the project (landscape and/or interiorscape)

Competency Builders:
Interpret plans and specifications
Identify safety requirements
Organize site preparation
Locate project materials
Outline personnel needs
Outline equipment needs
Outline project schedule

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Maintain landscapes and equipment

Competency Builders:
Identify water requirements
Apply water at proper rates
Identify weeds
Apply herbicides safely
Apply fertilization requirements at proper rates
Apply corrective measures to pest, insect, and disease problems
Prune landscape plants
Maintain turf viability (i.e., mow at proper height and frequency, aerate, edge, clip, and remove trash)
Cultivate plants
Remulch plants
Stake trees
Repair landscape plants (e.g., trees, shrubs)
Provide protection for plants from adverse weather conditions
Maintain landscape equipment
Demonstrate procedures for protecting plants from adverse weather
Demonstrate procedures for protecting equipment from adverse weather

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Maintain customer relations**

Competency Builders:
Conduct walk-through of project with client to assure satisfaction
Identify current and future maintenance requirements

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Maintain landscape tools and equipment**

Competency Builders:
Identify equipment needs for the company
Operate equipment for the job
Demonstrate the service and maintenance of power equipment
Demonstrate the repair and maintenance of facilities
Instruct employees in the safe use of tools and equipment
Demonstrate the safe use of tools and equipment to employees
Develop preventative maintenance program for landscape equipment

Unit: Turf and Landscape Operations

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Identify plant requirements and value

Competency Builders:
Identify hardiness zones
Identify landscape value
Identify plant environmental preferences
Identify planting and maintenance levels
Identify environmental value

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Identify and classify plants**

Competency Builders:
Classify turf and landscape plants as monocots or dicots
Classify turf and landscape plants as annuals, biennials, or perennials
Identify bulbs
Identify annual flowers
Identify perennial flowers
Identify shade trees
Identify ornamental trees
Identify ornamental grasses
Identify shrubs
Identify ground covers
Identify conifers
Identify plants according to scientific name
Identify environmental plant preferences
Classify plants according to growth habit
Identify wildflowers
Identify herbs
Identify fruit trees
Identify ferns
Identify weeds
Identify turfgrasses
Identify vines
Identify vegetable plants
Identify improved varieties
Identify foliage plants
Identify flowering plants

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Prepare for installation**

Competency Builders:
Follow general safety precautions
Outline planting depth
Outline planting time
Interpret seed and bulb tag information
Read landscape plan
Convert scale to site
Identify material quantities
Identify underground utilities
Plan planting schedules
Plan soil erosion controls
Prepare seeds for sowing
Match plant requirements to environmental conditions
Select seeds and plants
Follow planting rate recommendations

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Prepare soil mixes**

Competency Builders:
Follow general safety precautions
Identify soil types
Mix materials
Prepare compost
Identify mixing techniques
Identify media materials

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Prepare planting area**

Competency Builders:
Follow general safety precautions
Define areas
Provide rough grade
Create contour
Incorporate soil amendments
Provide finish grade
Apply soil amendments

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Install turf, landscape, and nursery plants**

Competency Builders:
Follow general safety precautions
Plant seeds
Plant bulbs
Plant shrubs
Plant ground covers
Plant annual and perennial plants
Plant trees
Stake trees
Guy trees
Water in plant material
Lay sod
Apply mulch
Plant drought-resistant and disease-resistant cultivars
Sterilize equipment
Divide plants
Separate plants
Pot trees and shrubs
Transplant seedlings
Identify planted specimens
Perform initial waterings

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Fertilize plants**

Competency Builders:
Follow general safety precautions
Interpret manufacturer's fertilization rate charts
Interpret fertilizer labels
Identify application methods
Calibrate fertilizer application equipment
Mix fertilizer solutions
Apply liquid fertilizer
Apply dry fertilizer
Identify application pattern
Identify nutrient requirements
Identify symptoms of nutrient deficiency
Identify kind and amount of fertilizer and soil amendments to apply
Select application method
Use fertilizer injectors
Use organic fertilizers
Use polymers
Maintain fertilizer records

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Maintain plants**

Competency Builders:
Follow general safety precautions
Pinch plants
Cultivate plants
Water plants
Apply mulches
Prune trees
Prune shrubs
Transplant bulbs, corms, and tubers
Treat tree wounds
Remove fallen leaves
Remove old flowers
Apply growth-regulating compounds
Maintain plants on arbors and trellises
Compost plant debris
Use growth regulators
Disbud flowering plants
Thin plants, seedlings, and cuttings
Space plants
Repot plants
Stake trees
Guy trees
Climatize plants
Weed fields
Check for insect and disease problems
Weed planting beds

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Maintain turfgrasses**

Competency Builders:
Follow general safety precautions
Apply top dressing to turfgrass areas
Verticut turf
Overseed turf
Water turf
Arify turf
Renovate turf
Fill in holes and depressions in turf
Relocate holes and tee markers
S ıt seed turf
Mow turf
String trim turf
Edge turf
Apply growth regulators
Compost clippings

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Prune plants

Competency Builders:
Follow general safety precautions
Identify pruning tools
Sterilize pruning equipment
Identify pruning time
Identify structural problems
Identify lowest branch height
Outline desired shape
Identify water sprouts
Space branches
Select scaffold branches
Prune shrubs
Root prune
Train central leaders

Unit: Nursery Production Management

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Identify plant requirements and value

Competency Builders:
Identify hardiness zones
Identify landscape value
Identify plant environmental preferences
Identify planting and maintenance levels
Identify environmental value

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Identify and classify plants**

Competency Builders:
Classify turf and landscape plants as monocots or dicots
Classify turf and landscape plants as annuals, biennials, or perennials
Identify bulbs
Identify annual flowers
Identify perennial flowers
Identify shade trees
Identify ornamental trees
Identify ornamental grasses
Identify shrubs
Identify ground covers
Identify conifers
Identify plants according to scientific name
Identify environmental plant preferences
Classify plants according to growth habit
Identify wildflowers
Identify herbs
Identify fruit trees
Identify ferns
Identify ferns
Identify weeds
Identify vines
Identify improved varieties
Identify foliage plants
Identify flowering potted plants

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Prepare for planting and propoagation**

Competency Builders:
Follow general safety precautions
Outline planting rates
Outline planting depth
Outline planting time
Interpret seed and bulb tag information
Prepare seeds for sowing
Match plant requirements to environmental conditions
Select seeds, plants, and cuttings
Sterilize equipment and containers
Follow planting rate recommendations

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Prepare media mixes**

Competency Builders:
Follow general safety precautions
Identify soil types
Mix media materials
Prepare compost
Identify mixing techniques
Identify media materials

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Prepare planting area**

Competency Builders:
Follow general safety precautions
Incorporate soil amendments
Apply soil amendments
Identify surface drainage areas

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Prepare for planting**

Competency Builders:
Follow general safety precautions
Plant seeds
Plant bulbs
Plant shrubs
Plant ground covers
Plant annual and perennial plants
Plant trees
Stake trees
Water in plant materials
Apply cover crops as needed
Plant drought-resistant and disease-resistant cultivars
Take cuttings
Sterilize equipment
Divide plants
Separate plants
Perform grafts and bulbs
Pot trees and shrubs
Transplant cuttings and seedlings
Apply rooting hormone
Identify planted specimens
Perform initial waterings

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Fertilize plants**

Competency Builders:
Follow general safety precautions
Interpret manufacturer's fertilization rate charts
Interpret fertilizer labels
Identify application methods
Calibrate fertilizer application equipment
Mix fertilizer solutions
Apply liquid fertilizer
Apply dry fertilizer
Identify application pattern
Identify nutrient requirements
Identify symptoms of nutrient deficiency
Identify kind and amount of fertilizer and soil amendments to apply
Select application method
Use fertilizer injectors
Use organic fertilizers
Use polymers
Maintain fertilizer records

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Maintain plants**

Competency Builders:
Follow general safety precautions
Pinch plants
Cultivate plants
Water plants
Apply mulches
Prune trees
Prune shrubs
Transplant bulbs, corms, and tubers
Treat tree wounds
Remove fallen leaves
Remove old flowers
Apply growth-regulating compounds
Maintain plants on arbors and trellises
Compost plant debris
Use growth regulators
Disbud flowering plants
Thin plants, seedlings, and cuttings
Space plants
Repot plants
Wrap trees
Stake trees
Guy trees
Climatize plants
Weed fields
Check for insect and disease problems
Weed planting beds

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Prune plants**

Competency Builders:
Follow general safety precautions
Identify pruning tools
Sterilize pruning equipment
Identify pruning time
Identify structural problems
Identify lowest branch height
Outline desired shape
Identify water sprouts
Space branches
Select scaffold branches
Prune shrubs
Root prune
Train central leaders

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Harvest plants**

Competency Builders:
Follow general safety precautions
Package plants
Label plants
Clean plants
Acclimate plants
Grade plants
Preserve plant viability
Apply antidesiccants
Wrap tree head
Dig shrubs and trees
Ball shrubs and trees
Burlap shrubs and trees
Harvest bare root stock
Comply with regulations regarding plant inspection and movement
Apply American Association of Nurserymen (AAN) sizing/grading standards

Unit: Irrigation

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Maintain water delivery systems

Competency Builders:
Identify types of pipe, pipe fittings, insulation, and plumbing fixtures
Open trench line
Locate existing underground water lines
Cut and fit pipe or tubing (e.g., PVC, aluminum)
Tap into existing waterlines
Install pipe and pipe fittings
Install valves and faucets
Install filters
Test sprinkler spray patterns
Adjust sprinkler spray patterns
Backfill trenches
Replace gaskets
Unclog pipes
Install flow-control devices
Winterize water delivery systems
Maintain filter system
Install insulation
Maintain automatic waterers
Install sprinkler heads and mist heads
Repair lines and nozzles on spray equipment
Repair broken pipes, sprinkler heads, mist heads, valves, and faucets
Thread metal pipe
Troubleshoot automatic sprinkler system
Repair automatic sprinkler system

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Operate irrigation system**

Competency Builders:
Follow general safety precautions
Determine sprinkler precipitation rate
Adjust sprinkler patterns
Adjust water pressure
Program automatic timers
Hand water plants
Calibrate injection systems
Monitor injection systems
Winterize systems

Unit: Landscape Design

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Conduct site analysis

Competency Builders:
Identify soil types
Identify rock outcroppings
Identify water sources
Identify existing vegetation
Identify existing structures
Identify direction (North, South, East, West)
Identify climate of site
Identify location of utilities
Identify legal aspects of site, right of ways
Identify circulation routes
Cite unfavorable and favorable views
Cite location of pedestrian traffic
Cite noise sources
Cite dust sources
Cite sources of bright light
Evaluate equipment accessibility

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Analyze customer needs**

Competency Builders:
Identify general entertaining preferences
Identify sports areas
Identify cooking needs, indoor and/or outdoor
Identify gardening and/or bird watching preferences
Identify pet needs
Identify storage needs
Identify laundry needs
Identify cost parameters for project
Identify family needs (e.g., children, plant preferences, colors)

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Perform area layout**

Competency Builders:
Layout public area
Layout private/outdoor living area
Layout service/utility area

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Apply principles of design

Competency Builders:
Use principle of simplicity
Use principle of contrast
Use principle of transition
Use principle of radiation
Use principle of scale
Use principle of rhythm
Use principle of balance (symmetry, asymmetry)
Use principle of unity
Use principle of harmony
Use principle of focus

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Apply elements of design**

Competency Builders:
Use element of texture
Use element of color
Use element of form
Use element of size and mass
Use element of line and direction
Use element of space
Use element of shadow

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Describe how plants are used in design**

Competency Builders:
Describe plants used as shade and/or as climate control
Describe plants used as enframement
Describe plants used as background
Describe plants used as boundary or border
Describe plants used as screens
Describe plants used as accents
Describe plants used as softening architectural lines or features
Describe plants used as specimen plants
Describe plants used as foundation plantings
Describe plants used as ground cover plantings
Describe plants used as espalier plantings
Describe plants used in muffling noise
Describe plants used in attracting wildlife
Describe plants used in the creation of illusion of space, size, and distance
Describe plants used in direction of traffic
Describe plants used as fruit, flower, fragrance

BIL: Essential

EDU:	12	AD	AC
		P	

Competency: **Correlate architecture with landscape design**

Competency Builders:
Identify types of landscape design suitable for Colonial architecture
Identify types of landscape design suitable for European architecture
Identify types of landscape design suitable for Oriental architecture
Identify types of landscape design suitable for Contemporary architecutre

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Plan transport structures**

Competency Builders:
Plan walks
Plan driveways
Plan steps
Plan decks and patios
Plan handicap accessibility

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Plan retention structures**

Competency Builders:
Plan fences and walls
Plan miscellaneous structures (e.g., gazebos, lawn statuary)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Describe use of structural materials**

Competency Builders:
Describe advantages and disadvantages of using asphalt
Describe advantages and disadvantages of using concrete
Describe advantages and disadvantages of using brick
Describe advantages and disadvantages of using flagstone
Describe advantages and disadvantages of using field stone
Describe advantages and disadvantages of using loose aggregates
Describe advantages and disadvantages of using wood
Describe advantages and disadvantages of using tanbark and wood chips

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Identify plant considerations

Competency Builders:
Describe habits of growth of various plants
Describe hardiness of various plants
Describe maintenance of various plants
Describe fruit, flower, foliage, and branching characteristics of various plants
Differentiate evergreen and deciduous plants
Describe advantages and disadvantages of various trees, shrubs, ground covers, espaliers, and vines
Describe color coordination
Describe use of bedding plants and ground covers

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Address problem areas of landscape design**

Competency Builders:
Address slopes and erosion control
Address harsh exposure
Address poor drainage
Address cuts
Address fills
Address compaction
Address retention of existing vegetation

BIL: Recommended

EDU:	12	AD	AC
	I	P	

Competency: **Design special types of gardens**

Competency Builders:
Design rock gardens
Design Japanese gardens
Design formal gardens
Design informal gardens
Design perennial gardens
Design shade and forest gardens

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Design around focal point(s)**

Competency Builders:
Design around ponds, basins, pools, waterfalls, and fountains
Place outdoor lighting properly to enhance focal point(s)
Place irrigation system properly to enhance focal point(s)
Install sod and lawn around focal point(s)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Apply landscape grading techniques**

Competency Builders:
Interpret prints and specifications
Locate utilities
Build topographic features

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Install plant materials

Competency Builders:
Interpret prints and specifications
Install trees
Install shrubs
Install ground covers, annuals, or perennials
Provide for weed control
Apply mulches (e.g., plastic, organic, fiberglass)
Apply herbicides
Provide for erosion control
Edge beds
Outline costs and labor for installation
Water as required
Fertilize as required

BIL: Essential

EDU:	12	AD	AC
.	I	P	

Competency: Explain use of various construction materials

Competency Builders:
Describe uses and costs of lumber in landscape design
Describe uses and costs of railroad ties in landscape design
Describe uses and costs of brick in landscape design
Describe uses and costs of block in landscape design
Describe uses and costs of stone and flagstone in landscape design
Describe uses and costs of gravel in landscape design
Describe uses and costs of plastic and fiberglass in landscape design
Describe uses and costs of concrete in landscape design
Describe uses and costs of metal in landscape design
Describe uses and costs of sand in landscape design
Describe uses and costs of artificial turf in landscape design

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Construct garden surfaces**

Competency Builders:
Construct garden paths and walks
Construct patios and terraces
Construct steps
Construct foot bridges
Identify costs of labor and materials involved in constructing garden surfaces

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Construct landscape enclosures

Competency Builders:
Construct raised beds
Construct retaining walls and free standing walls
Construct fences, screens, and gates
Construct trellis
Identify costs of labor and materials involved in constructing enclosures
Construct other structures

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Install electrical landscape features**

Competency Builders:
Install outdoor lighting
Install submersible pumps
Install timers and valves
Follow electrical contractor's code
Identify costs of labor and materials involved in installing electrical features

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Construct water features

Competency Builders:

Construct pools

Construct fountains

Construct waterfalls

Construct creek beds

Identify costs of labor and materials involved in constructing water features

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Construct irrigation and drainage systems**

Competency Builders:
Apply knowledge of pressure and flow
Apply knowledge of pipes, nozzles, and valves
Apply knowledge of trenching
Install tile
Install sumps and drains
Identify costs of labor and materials involved in constructing irrigation and drainage systems and site reclamation
Compare sprinkler, bubbler and drip irrigation systems

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Maintain customer relations**

Competency Builders:
Conduct walk-through of project with client to assure satisfaction
Identify current and future maintenance requirements

Unit: Drafting Technology

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Apply basic drafting skills

Competency Builders:

Use drafting equipment, measuring scales, drawing media, drafting instruments and consumable materials, blueprint machine
Identify line styles and line weights
Select proper drawing scale, introduction to different types
Prepare title blocks and other drafting formats
Apply forehand and other lettering techniques
Prepare multi-view drawings
Prepare multi-view sketches
Prepare orthographic views
Prepare change control block
Describe change control block/revision block
Measure angles
Draw horizontal, vertical, angular, parallel, and perpendicular lines
Transfer an angle
Control tangent lines (to arcs) and tangent arcs (to arcs)
Bisect lines, angles, and arcs
Divide lines
Construct three-point circle
Construct regular hexagon, pentagon, and octagon
Reproduce a drawing
Prepare single-view drawings
Prepare dimension drawings
Interpret notes and dimensions to determine part
Draw arcs, circles, and conics
Transfer measurements

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Apply intermediate drafting skill

Competency Builders:
Describe types of diazo and their applications
Apply isometric, oblique and perspective sketching techniques
Prepare isometric, oblique and perspective sketches
Prepare sectional views
Prepare auxiliary views
Identify landscape symbols
Apply systems drafting techniques
Identify a materials list
Describe purpose of auxiliary and sectional views

BIL: Recommended

EDU:	12	AD	AC
		I	

Competency: **Apply advanced drafting skills**

Competency Builders:
Interpret reports and specifications
Prepare pictorial drawings
Prepare schematics

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Interpret prints**

Competency Builders:
Visualize object from drawing
Interpret sectional views
Interpret dimensions
Interpret tolerances
Interpret special symbols
Interpret schematics

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Convert dimensions and tolerances**

Competency Builders:
Convert dimensions and tolerances from English units to metric units
Convert dimensions and tolerances from metric units to English units

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate dimensioning techniques**

Competency Builders:
Construct arrowheads using various styles/discipliens
Apply symbols for surface and texture control
Add labels/notes to drawing
Interpret decimal tolerance dimensions
Dimension arcs
Dimension angles
Dimension curves
Dimension rounded-end shapes
Dimension spherical objects
Dimension cylindrical objects
Dimension cones, pyramids, and prisms
Dimension features on circular center line
Dimension theoretical point of intersection
Dimension object using rectangular coordinate system
Dimension object using polar coordinate system
Dimension object using tabular coordinate system
Dimension object using ordinate dimensioning system

Unit: Computer Aided Design (CAD) Fundamentals

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Operate a CAD system

Competency Builders:
Execute CAD system
Use keyboard input
Use screen and pull down menus
Use other input devices (e.g., scanner, digitizer)
Create scaled plots
Operate a pen plotter
Operate a printer-plotter (e.g., laser plotter)
Access online help for commands
Use file conversion
Use data transfer

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Select entities for action**

Competency Builders:
Add or remove entities separately
Add or remove entities using a window
Select entities using a fence
Select entities by other methods (e.g., last, previous, type, all, etc.)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Control display**

Competency Builders:
Apply view control while drawing (e.g., zoom and pan)
Control view resolution (e.g., viewers)
Save views
Display views

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Extract basic entity and drawing information**

Competency Builders:
Measure distances
Measure areas
Identify coordinates
List entity characteristics (e.g., length, size, location, properties, etc.)

Unit: Arboriculture

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Demonstrate knowledge of tree biology**

Competency Builders:
Identify tree anatomy and physiology
Identify tree structure and function
Identify tree taxonomy
Use scientific nomenclature
Identify plant characteristics
Describe principles of identification

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Describe tree, soil, and water relationships**

Competency Builders:
Identify soil properties
Explain root growth
Describe water movement and retention
Describe water management
Describe tree nutrition and fertilization mineral requirements

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Demonstrate knowledge of tree selection**

Competency Builders:
Match tree and planting site
Describe installation
Explain planting and transplanting
Describe care after planting/transplanting

BIL: Recommended

EDU:	12	AD	AC
	I	P	

Competency: Transplant large trees and shrubs

Competency Builders:
Differentiate deciduous trees and shrubs
Differentiate needled, conifer, and broadleaf evergreen trees and shrubs
Describe tree and shrub growth requirements
Identify tree root systems
Harvest ball and burlap
Harvest bare root trees
Prepare holes for transplanting
Plant trees
Stake trees
Water trees

BIL: Essential
Not applicable for NT

EDU:	12	AD	AC
	I	P	

Competency: **Prune mature trees and shrubs**

Competency Builders:
Remove pruned materials
Dispose of pruned materials
Describe effect of tree growth habits on pruning operations
Differentiate pruning time for broadleaf evergreens and conifers, and deciduous shrubs
Use climbing equipment safely
Handle ladders
Use power wood chipper safely
Climb trees
Use aerial lift equipment safely
Select appropriate pruning equipment
Use hand pruning tools (e.g., saws, shears)
Operate saws and power shears safely
Operate hydraulic equipment

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: Explain pruning principles and techniques

Competency Builders:
Identify pruning cuts: CODIT (compartmentalization of decay in trees)
Explain central leader system
Explain open center system
Explain modified leader system
Explain espaliering
Explain topiary
Explain thinning
Explain heading back
Explain shearing
Explain root prune

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Maintain basic hand pruning tools and equipment**

Competency Builders:
Sharpen pruning tools and equipment
Adjust pruning tools and equipment
Lubricate pruning tools and equipment
Store pruning tools and equipment
Sterilize pruning tools

BIL: Essential
Not applicable for NT

EDU:	12	AD	AC
	I	P	

Competency: **Work in the tree**

Competency Builders:
Demonstrate safe climbing techniques
Demonstrate cabling and bracing
Install lightning protection
Use basic rigging systems
Safely cull trees and shrubs
Shape trees and shrubs
Repair trees and shrubs
Safely use ropes and knots

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate diagnostic procedure for plant problems**

Competency Builders:
Describe the diagnostic process
Explain tree stress and the "healthy" tree
Identify common insects and diseases
Describe physiological disorders and injuries
Describe prevention treatment and continued plant health care
Demonstrate methods of applying fertilizer to trees and shrubs
Identify abiotic problems (e.g., weedeater, mechanical, paving damage)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Identify tree and shrub pests**

Competency Builders:
Differentiate chewing, sucking, boring, and rasping insects
Differentiate bacterial, viral, and fungal diseases
Explain preventative measures to protect trees and shrubs from injuries

BIL: Essential
Not applicable for NT

EDU:	12	AD	AC
	I	P	

Competency: **Manage pests in mature trees and shrubs**

Competency Builders:
Select the proper pesticide
Identify coverage and coverage requirements
Prepare pesticide solutions
Adjust sprayers
Operate sprayers
Spray prescribed area safely
Clean sprayers
Repair sprayers

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Evaluate trees

Competency Builders:
Identify nutritional deficiencies
Prevent injury to trees and shrubs
Recognize mechanical injury
Recognize damage caused by rodents and deer
Recognize water injury
Recognize hazardous trees

BIL: Essential
Not applicable for NT

EDU:	12	AD	AC
	I	P	

Competency: **Remove trees**

Competency Builders:
Fell trees
Prepare area for safety
Prepare drop area
Select proper equipment
Apply safety procedures
Make primary notch cut
Make final cut
Buck limbs
Demonstrate ropes/knots/rigging

BIL: Essential
Not applicable for NT

EDU:	12	AD	AC
	I	P	

Competency: **Repair mature plant material**

Competency Builders:
Support limbs
Brace limbs
Clean cavities and splits
Treat cavities and splits

BIL: Essential
Not applicable for NT

EDU:	12	AD	AC
	I	P	

Competency: **Describe the arborist's legal responsibilities**

Competency Builders:
Explain pesticide liability
Explain property liability

Unit: Landscape Construction

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Install the project landscape

Competency Builders:
Locate existing utilities
Rough grade the site
Outline procedures for installing large materials
Install irrigation system
Describe procedures for constructing hardscape (e.g., walls, walks, patio, drives)
Lay out plants
Install plants (i.e., remove labels, fertilizer application)
Prepare final grade
Install lawns and turfs
Install mulch
Water as required
Perform final cleanup (tool search)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Install a drainage system**

Competency Builders:
Identify the natural slope/grade of an area
Identify the texture and percolation characteristics of the soil
Identify techniques for constructing ditches and culverts
Direct the movement of water away from structures and installations
Plan the construction of an underground drainage system
Order appropriate fill materials
Identify proper elevations for a landscape site
Grade a landscape site
Read soils and contour maps

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Install an irrigation system**

Competency Builders:
Identify irrigation requirements
Assess quality of irrigation water
Plan an irrigation system
Supervise the installation of irrigation equipment
Service electric and engine driven pumps
Operate a low-volume irrigation system
Operate an overhead irrigation system
Operate an automatic irrigation system
Calculate cost efficiency of an irrigation system

BIL: Recommended

EDU:	12	AD	AC
		I	

Competency: **Construct with concrete**

Competency Builders:
Follow general safety precautions
Select hand concrete tools
Use hand concrete tools
Excavate structure sites for concrete pouring
Install concrete reinforcement
Build concrete forms
Remove concrete forms
Mix and pour concrete
Cure concrete
Use survey level
Select concrete materials and additives
Calculate volume of concrete to order or mix
Finish concrete surface
Lay block
Lay brick
Install concrete edging
Use power concrete tools

BIL: Essential

EDU:	12	AD	AC
		P	

Competency: **Construct with stone and pavers**

Competency Builders:
Follow general safety precautions
Excavate for foundation
Apply aggregates
Compact aggregates
Grade sand using screen
Install edging
Lay pavers
Lay gravel
Select stone
Face stone
Set landscape stones
Lay stone
Construct wall
Operate cutting saws/tools
Install drainage behind walls

BIL: Essential

EDU:	12	AD	AC
		P	

Competency: **Construct with wood**

Competency Builders:
Follow general safety precautions
Cut lumber to dimension
Cut and fit joints
Select and use metal fasteners
Assemble joints with glue
Cut and set timber and poles
Install bracing
Repair bracing
Install siding
Repair siding
Select types of wood
Identify use of recycled materials

BIL: Recommended

EDU:	12	AD	AC
		I	

Competency: **Plan electrical installations**

Competency Builders:
Follow general safety precautions
Follow electrical codes
Identify electrical needs
Plan distribution system
Plan wiring layouts
Select wire and electrical supplies
Identify alternative electrical sources

BIL: Essential

EDU:	12	AD	AC
		P	

Competency: **Maintain electrical systems**

Competency Builders:
Follow general safety precautions
Repair extension cords
Install low-voltage lighting fixtures
Replace or reset circuit breakers and fuses
Install outlets and switches
Install electric motors
Repair outdoor wiring
Splice outdoor wiring
Lubricate motors
Install computerized components

BIL: Essential

EDU:	12	AD	AC
		P	

Competency: Maintain fencing

Competency Builders:
Follow general safety precautions
Lay out fence
Install posts and braces
Install fasteners
Identify options in fencing systems
Identify amount of fence required
Select fencing materials
Select posts and braces
Select fasteners
Install gates
Identify use of recycled materials (e.g., plastics)

Unit: Golf Course Operations

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Differentiate golf course types

Competency Builders:
Classify golf courses by ownership
Classify golf courses by clientele
Classify golf courses by length and layout
Classify golf courses by management structure

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate knowledge of golf course design and construction**

Competency Builders:
Identify objective of the construction
Explain cost analysis and financing
Explain the role of the architect
Describe form and function of features
Relate golf course design to length, difficulty of play, flexibility, speed of play, ease of maintenance, safety, use of land
Demonstrate knowledge of installation, irrigation, and drainage
Demonstrate turfgrass establishment
Describe putting green construction according to USGA specifications
Compare other means of putting green construction
Describe water hazards
Describe bunker construction
Describe lateral water hazards
Describe cart path construction
Explain the length of golf holes and golf courses
Explain the rating of golf holes by par

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Explain chemical programming**

Competency Builders:
Describe fertilizer and pest control programs
Describe reasons for product selection
Explain purchasing
Use application equipment

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate knowledge of capital equipment**

Competency Builders:
Define inventory, valuation, and depreciation
Identify items needing replacement
Select appropriate equipment
Explain purchasing vs. renting or leasing
Explain how budgets cover capital items
Explain importance of preventative maintenance

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Prepare annual budget**

Competency Builders:
Collect information
Interpret last year's records
Put budget on paper
Sell the budget
Follow the budget

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Irrigate plants and turfs**

Competency Builders:
Identify water needs of plants
Identify irrigation components and types of systems
Identify sources of water for irrigation
Install irrigation systems with control valves and clocks
Identify drainage components for different types of drainage systems
Install drainage systems
Repair irrigation systems
Identify soil structures to determine proper irrigation and drainage systems (e.g., topsoil, subsoil)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Explain the ground rules of golf course maintenance**

Competency Builders:

Describe the marking of the course (e.g., lengths, out-of-bounds, hazards, grounds under repair)
Demonstrate the setting of cups and tees
Identify appropriate mowing heights
Demonstrate bunker maintenance
Explain the special needs associated with tournaments, outings, and contests
Explain rules of golf

Unit: Turfgrass Management for Golf Courses

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Establish golf course turf

Competency Builders:

Select proper turfgrass species and cultivar for various locations (e.g., cool vs. warm season, greens, tees, fairways, roughs, maintenance budget, availability, species and cultivar features)
Acquire materials
Measure site area
Determine material application rate
Calculate amount of material needed
Explain interseeding and overseeding
Prepare the site
Clear the site
Rough grade the site
Contour the site
Fertilize the site
Plant turf (e.g., seeding, sodding, plugging)
Calibrate application equipment
Demonstrate sprigging, seeding, sodding, and plugging

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Mow golf course turf**

Competency Builders:
Explain mowing needs of turf
Explain differences and pros and cons of reel mowers vs. rotary mowers
Demonstrate rotary mower operation and adjustment
Demonstrate reel mower operation and adjustment
Develop a golf course mowing schedule, given equipment and manpower resources and hours of operation
Maintain reels

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Irrigate golf course turf

Competency Builders:
Explain turfgrass water needs
Program sprinkler controller to achieve turfgrass water needs
Demonstrate hand watering of turf
Determine need for irrigation by observing turf and soil

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Fertilize golf course turf**

Competency Builders:
Demonstrate sampling for a soil test
Evaluate soil test results
Explain types of fertilizers and their composition
Develop a fertilization plan, given performance needs
Develop a fertilization plan, given budget
Develop a fertilization plan, given type of turfgrass variety
Calibrate fertilization equipment
Apply fertilizer to turf areas

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Demonstrate types of turfgrass cultivation

Competency Builders:
Demonstrate aerification
Explain pros and cons of hollow tine aerification
Explain pros and cons of solid tine aerification
Demonstrate high pressure water aerification
Explain pros and cons of high pressure water aerification
Demonstrate spiking/slicing
Explain pros and cons of spiking/slicing
Demonstrate deep tine aerification (Vertidrain)
Explain pros and cons of deep tine aerification (Vertidrain)
Demonstrate vertical mowing
Explain pros and cons of vertical mowing
Demonstrate grooming
Explain pros and cons of grooming
Demonstrate rolling
Explain pros and cons of rolling
List methods for topdressing
List advantages to different methods for topdressing
Demonstrate topdressing
Explain pros and cons of topdressing
Demonstrate brushing
Explain pros and cons of brushing

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Control pests

Competency Builders:

Identify common turfgrass insect pests and their damage
Explain cultural control methods of common turfgrass insect pests and their damage
List common chemical control for common turfgrass insect pests and their damage
Identify common turfgrass disease pests and their damage
Explain cultural control methods for common turfgrass disease pests and their damage
List common chemical controls for common turfgrass disease pests and their damage
Apply fundamentals of IPM
Identify common turfgrass weed pests
Explain cultural control methods of common turfgrass weed pests
List common chemical controls for common turfgrass weed pests

Unit: Nursery Operations

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Propagate nursery stock

Competency Builders:

Collect propagation materials (e.g., seeds, cuttings, scions, bulbs) at proper time
Demonstrate propagation by grafting, budding, layering, separating, dividing, cutting, and tissue culturing
Prepare flats and a seedbed
Plant seeds
Prepare a rooting bed
Prepare propagation materials (e.g., seeds, cuttings, scions) for planting
Apply growth stimulants to propagation materials
Control propagation facility environment (e.g., moisture, temperature, light, pH and fertilization of field grown material)
Transplant rooted propagation materials, including tissue culture transplants
Demonstrate sanitation and safety practices

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Market nursery stock**

Competency Builders:
Label plants for sale
Maintain clean and attractive merchandising and display areas
Use various advertising methods to promote sales
Take telephone orders
Use sales catalog
Greet customers
Describe care and use of plants to customers

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Perform field and container planting and maintenance

Competency Builders:
Manage material in cold storage
Use cover crops
Describe elements of soil preparation in the field (e.g., drainage, pH, nutrient levels)
Design field layout and spacing, including irrigation systems and erosion control
Maintain field nursery (e.g., mowing, weed control, pruning, spraying, fertilizing)
Demonstrate sanitation and safety practices
Prune nursery stock
Shape nursery stock
Prune plants to achieve desired growth
Select chemical growth regulators
Use chemical growth regulators
Root-prune nursery plants and trees
Identify techniques for pruning specialty items (e.g., topiary, espalier, bonsai)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Perform field harvesting**

Competency Builders:
Use specialized digging equipment
Perform hand digging, ball and burlap
Perform bare root digging
Determine care of ball and burlap and bare root plants before planting
Identify proper loading and shipping techniques

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Demonstrate agronomy knowledge**

Competency Builders:
Identify soil types and the properties of each
Explain soil amendments and how they are used (e.g., peat, sand, clay, compost)
Demonstrate how irrigation and drainage systems affect soil and plant health

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Irrigate plants**

Competency Builders:
Identify various types of irrigation components and systems
Use various types of irrigation components and systems
Set up irrigation system for propagation area
Set up irrigation system for greenhouse or enclosed structure
Set up irrigation system for shadehouse
Set up irrigation system for retail display area
Set up irrigation system for field growing area

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Prepare growing media and seeds**

Competency Builders:
Prepare rooting and growing media according to plant requirements
Sterilize rooting, potting, and growing media
Collect and test a soil sample from field and potting media
Adjust pH and nutritional levels of media
Prepare planting beds and sites
Fill benches and pots with media
Level benches and pots with media
Demonstrate sanitation practices when handling and storing plant media materials
Construct drainage ditches in field growing area
Repair drainage ditches in field growing area

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Propagate plant materials**

Competency Builders:
Collect propagation materials (e.g., seeds, cuttings, scions, bulbs) at proper time
Demonstrate propagation by grafting, budding, separating, dividing, cutting
Explain layering and tissue culture
Prepare flats and seedbeds
Plant seeds
Prepare a rooting bed
Prepare propagation materials (e.g., seeds, cuttings) for planting
Apply growth stimulants to propagation materials
Control propagation facility environment (e.g., moisture, temperature, light)
Transplant rooted propagation materials, including tissue culture transplants
Demonstrate sanitation and safety practices when propagating
Identify proper tools and their maintenance (e.g., sterilization)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Control plant growth by cultural, environmental, and chemical methods**

Competency Builders:
Disbud flowering plants
Apply growth-regulating chemicals
Apply shading compound to greenhouse structure
Prune plants to achieve desired growth

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Irrigate plants

Competency Builders:
Identify water needs of plants
Identify irrigation components and types of systems
Identify sources of water for irrigation
Install irrigation systems with control valves and clocks
Repair irrigation systems
Identify soil structures to determine proper irrigation and drainage systems (e.g., topsoil, subsoil)

Unit: Floral Design

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Explain the use of value as it relates to floral design**

Competency Builders:

Describe the number of flowers used in a $25.00 arrangement

Explain the concept of over-stuffing an arrangement and the consequence to the business

Describe how to arrive at proper value for an arrangement

BIL: Recommended

EDU:	12	AD	AC
	I	P	

Competency: **Explain the use of color as it relates to floral design**

Competency Builders:

Describe monochromatic color as it relates to floral design
Describe analogous color as it relates to floral design
Describe complementary and split complementary as it relates to floral design
Describe triadic color scheme as it relates to floral design
Describe color as it relates to interior design (e.g., floral shop, customers' homes, and businesses)
Mix colors (e.g., to create a color to match an accessory)
Describe colors to go with situations (e.g., baby boy - blue, baby girl - pink)
Describe color principles and use of color wheel

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: Demonstrate care and handling of flowers and greens

Competency Builders:
Follow general safety precautions
Explain importance of bucket and tool cleanliness and disinfection
Identify temperature needs
Use proper cutting technique
Mix preservatives and treatments
Strip foliage
Separate flower varieties and color
Identify ethylene sources (e.g., fruits)
Identify preservatives and treatments
Select preservatives and treatments
Identify major cut flowers and decorative foliage
Explain the correct procedure for unpacking and storing cut flowers
Differentiate non-saleable and healthy flowers

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Process potted plants, planters, and dish gardens**

Competency Builders:
Follow general safety precautions
Identify foliage and blooming plants for specific plant needs (e.g., light, water, and temperature)
Clean plants and containers
Trim plants
Decorate plants and containers
Attach care instructions
Attach price tags and Universal Product Codes (UPC's)
Explain the correct procedure for handling potted plants in the flower shop
Decorate and package a potted flowering plant for sale
Identify plant pests and/or diseases
Decorate with fresh/dried flowers

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Construct floral arrangements**

Competency Builders:
Identify flowers and foliage
Identify arrangement style for occasion
Select flowers, foliage, and containers for specific tasks
Construct asymmetrical arrangements
Construct round arrangements
Construct oblong arrangements
Construct vertical arrangements
Construct horizontal arrangements
Construct triangular arrangements
Apply color principles
Apply principles and elements of design
Identify design variations
Identify principles of design
Identify principles of efficient production of multiple pieces
Construct bud vases
Construct handheld bouquets (e.g., hand-ties, presentation bouquets)
Use silk and dry materials
Arrange fruit baskets
Construct sympathy arrangements
Construct party arrangements
Construct wedding arrangements
Construct contemporary arrangements (e.g., free form, vegetative, parallel, etc.)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Prepare materials for arrangements**

Competency Builders:
Identify flowers/foliage
Wire and tape materials
Select and prepare accessories
Make bows
Prepare containers using proper mechanics (e.g., oasis, Sahara, tape, chicken wire, styrofoam, etc.)
Use tulle, ribbon, netting, and lace as needed
Spray/tint dried and live floral products as needed
Explain the proper use of various floral containers and bases
Explain sizes and use of florist wire
Explain sizes, grades, and uses of floral ribbon and netting
Explain use of various mechanical aids used in floral design

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Design dish gardens (planters)**

Competency Builders:
Follow general safety precautions
Select plant containers
Arrange plants in a container
Fill containers with soil
Identify foliage and blooming plants
Select plants that are environmentally compatible
Prepare planters for sale (e.g., cleaning plant and container, and watering)
Design custom dish gardens
Trim with fresh or dried flowers and/or ribbons

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Prepare wedding flowers**

Competency Builders:
Identify proper flower/foliage
Follow wedding form instructions (e.g., proper bouquet knowledge and flower/foliage knowledge)
Construct novelty type bouquets
Construct colonial/nosegay bouquets
Construct arm-style bouquets
Construct assorted cascade bouquets
Construct traditional bouquets
Construct wedding boutonnieres and corsages
Construct rehearsal dinner, wedding and reception decorations
Set up rehearsal dinner, wedding and reception decorations
Dismantle wedding decorations
Service wedding
Perform maintenance of rental decorations
Assist with design of custom wedding flowers

BIL: Recommended

EDU:	12	AD	AC
	I	P	

Competency: **Prepare sympathy flowers**

Competency Builders:
Take specialty orders
Explain styles of sympathy arrangements
Identify proper flowers/foliage for style chosen
Identify funeral home procedures
Construct mechanics for assorted funeral pieces
Construct assorted casket pieces
Construct easel/standing sprays or wreaths
Construct vases
Construct pillows
Assist with design of custom sympathy flowers

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Maintain floral shop equipment and facilities

Competency Builders:
Follow general safety precautions
Use assorted floral cleaning supplies (e.g., bucket cleaner)
Clean display coolers
Clean storage containers and floral buckets
Perform general cleaning of showroom, work room, etc.
Maintain sidewalks and parking area (e.g., snow and ice removal)
Sharpen cutting tools
Lubricate cutting tools
Take an inventory

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Deliver merchandise**

Competency Builders:
Follow general safety precautions
Read an order correctly
Load floral arrangements properly
Outline delivery route
Maintain company image (e.g., personal appearance and ability to present themselves in a professional manner)
Unload merchandise
Maintain a good driving record and a driver's license
Read a road map
Describe proper weather protection of floral arrangements
Describe proper procedure to follow for non-deliverable arrangements

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Prepare silk/dry arrangements**

Competency Builders:

Prepare mechanics/container

Use equipment properly (e.g., Pik machine, glue gun, hot melt/pan glue, cool melt, wire cutters, etc.)

Design custom silk/dry arrangements

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Prepare flowers to wear**

Competency Builders:
Wire and tape flowers and foliage efficiently
Use floral glues and adhesives to construct or enhance flowers to wear
Make bows
Construct boutonnieres
Construct shoulder corsages
Construct wristlets
Construct fashion flowers (e.g., hat, purse, or shoe decorations)
Construct hair flowers
Package corsages and boutonnieres
Design custom flowers to coordinate with clothing

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Take general customer's orders

Competency Builders:
Take an order over the phone and in person
Interpret an order form
Take proper information needed for a specific order
Describe various types of floral industry wire services and the proper way to place and receive orders
Apply basic computer skills in using a wire service computer

Unit: Soil Science and Management

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Explain the importance of soil

Competency Builders:
Describe soil as a life supporting layer of material
Describe soil as a medium for plant growth
Identify agricultural uses of soil
Identify nonagricultural uses of soil
Describe land use in the U.S.

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Describe the geology of soil**

Competency Builders:
Identify the four major layers of the earth
Identify soil components
Define parent material
Differentiate among the major types of parent material
Describe the role of climate, organisms, and plants in soil formation
Describe the role of topography in soil formation
List the forms of plant life found in poor soil conditions
Define soil profile
Identify the soil horizons in a soil profile
Differentiate between surface soil and subsoil

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Describe composition of soil**

Competency Builders:

List the main components found in a normal soil
Explain the composition of the solid part of the soil
Describe the main sources of organic matter
List the approximate percentage in which each of the soil properties is found in a normal soil
Differentiate between soil low in organic matter and soil high in organic matter
Explain the value of each soil component with regard to proper growth of plants

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Identify physical properties of soil**

Competency Builders:

Define soil texture
Define soil density and permeability
Describe soil structure
Define soil consistence
Define soil tilth
Describe the role of soil temperature
Explain the significance of soil color
Interpret the organic matter content of the surface soil using soil color
Interpret internal drainage of the subsoil by observing soil color
Differentiate between "light" and "heavy" soils
Determine the texture of a soil sample
Classify soil samples using the textural triangle as a guide
Explain the effects of soil structure on productivity
Explain why dark color is not always due to organic matter content
Explain the effects of organic matter on soil structure
Describe the effects of soil structure on infiltration, percolation, and the potential for ground water contamination
Explain how soil type affects crop identification
Compare root restricting boundaries (e.g., plow pan, fragipan, etc.)
Describe factors that contribute to the formation of tillage or traffic pans
Describe methods for alleviating traffic pans (e.g., subsoiling, reduced tillage, no-till)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Describe the biological properties of soil

Competency Builders:

List the biological properties of soils
Explain how biological properties affect the nature and conditions of the soil
Identify the microorganisms that are found in the soil
List the soil microorganisms that are found in the soil
List the soil microorganisms that are beneficial to farmers
Describe the role of higher forms of plant and animal life in the soil
Explain the nitrogen and phosphorus cycle
Explain where the energy comes from to carry out the nitrogen transformations
Identify common bacteria in the nitrogen cycle
Explain the symbiotic relationship between bacteria and plants
Specify where bacteria are located in the roots of the plants
Explain nitrogen fixation
Identify the roles of different types of bacteria in nitrogen fixation
Describe the concept of mineralization and immobilization of plant nutrients by soil microorganisms
Explain the biological effects on soils when amended with fertilizers, pesticides, and recyclable materials such as municipal wastes
Describe the effects of poor drainage or waterlogging on soil properties and plant growth

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Describe the chemical properties of soil

Competency Builders:

List the chemical properties of soil

Explain how chemical properties affect the biological properties of soil and the nature and conditions of the soil

Explain the effect of cation-exchange capacity on plant production

Explain the chemical effects on soil when amended with fertilizers, pesticides and recyclable materials such as municipal wastes

Describe the effect of sand, silt and clay content on water and nutrient holding ability of soil (CEC)

Explain how charges on clay particles affect nutrient retention

Compare different types of clay to soil nutrient availability

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Define soil acidity and alkalinity**

Competency Builders:

Define pH
Create a chart of the pH scale to show degrees of soil acidity and alkalinity
Conduct laboratory tests for acidity of common products (e.g., fresh milk, sour milk, orange juice, and lemon juice)
Explain how calcium affects soil acidity and the availability of other elements
Explain how pH symbols are used in denoting the degree of acidity and alkalinity in soils
Describe the conditions that lead to soil acidity or alkalinity
List the optimum soil pH range for the major crops
Explain how soil acidity or basicity is corrected
Explain how soil pH affects the availability of nutrients

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate knowledge of soil water**

Competency Builders:

Define gravitational, capillary and hygroscopic water
Demonstrate the water holding capacities of sandy and clay soils
Determine soil water availability
List ways available water can be lost by soils
Identify the important factors in determining water movement in the soil
Explain the main purpose of water conservation
Explain how strip cropping can contribute to the conservation of soil water
Describe two types of mulch
Explain how production techniques influence the efficiency with which water is utilized by plants
Explain water holding capacity and how to determine field soil moisture
Explain the effect of texture and structure on field capacity
Describe responsibilities to ground water quality
Describe the plant, soil, and environmental factors that influence crop responses to irrigation
List several devices or methods used to schedule irrigation to conserve water and maximize crop yields

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Explain liming to correct soil acidity**

Competency Builders:

List the benefits obtained from liming a soil
List the steps involved in liming acid soils used for growing plants
Explain how lime reduces soil acidity
Explain how to determine the lime requirements for a specific crop
Identify different kinds of lime materials
Describe the appearance of plants growing in soils of different pH levels
List some sources of commercial lime
Describe different methods of applying lime and the type of equipment used
Formulate a liming schedule for various crops
Explain the effect of soil acidity on soil structure, water infiltration and soil aggregation
List some problems and effects associated with over-liming soil
Explain how lime particle size affects its ability to reduce soil acidity
List several materials that can be used to increase soil acidity or lower pH
Define dolomite limestone and calcitic limestone

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Test soil samples to determine characteristics**

Competency Builders:
Collect soil samples from test area
Complete soil data forms
Record texture, structure, temperature and color of each soil layer
Analyze soil data
Write report

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Test plant tissue samples**

Competency Builders:
Take plant tissue samples
Submit prepared plant tissue samples and forms to analysis laboratory
Interpret results of plant analysis

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Test water samples**

Competency Builders:
Take water samples
Submit water samples to analysis laboratory
Interpret results of water test

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Manage soil**

Competency Builders:
Evaluate soil drainage
Identify soil texture and percent organic matter
Identify soil structure and type
Determine slope
Determine soil-use capability for agriculture
Determine suitability of soil for nonagricultural uses
Evaluate problems affecting soil use and management
Determine management and conservation practices
Implement management and conservation practices
Comply with government regulations and guidelines

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Practice soil conservation**

Competency Builders:
Define various types of erosion
Explain how water erosion occurs
Identify methods of predicting soil loss
Demonstrate use of the Universal Soil Loss Equation
Describe ways of controlling water erosion
Describe wind erosion and its effects

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate knowledge of irrigation and drainage**

Competency Builders:
Explain the importance of drainage
Define wetlands and wet soils
Describe methods of artificial drainage
Identify types of irrigation systems
Describe the use of irrigation
Analyze water quality

Unit: Environmental Science and Ethics

BIL: Recommended

EDU:	12	AD	AC
	1	R	

Competency: **Explain the relationship between plants and animals within ecosystems**

Competency Builders:

Classify the major categories of organisms
Differentiate among biomes
Differentiate among types of ecosystems
Explain the dynamic nature of ecosystems
Define habitat and its importance to natural systems
Identify the functions of producers and consumers
Explain how biotic and abiotic factors affect producers and consumers
Categorize the various forms of animal life
Describes the interactions between producers, consumers, decomposers, and antagonists
Illustrate a food chain and food web

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Describe the character and value of natural resources**

Competency Builders:
Describe the value of natural resources
Describe the major categories of natural resources
Describe the types and distributions of natural resources
Contrast the origins of natural resources
Differentiate between renewable and non-renewable natural resources

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Identify renewable natural resources**

Competency Builders:
Define renewable natural resources
Define the major categories of renewable natural resources
Identify the origins of renewable natural resources
Describe the value of renewable natural resources

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Identify non-renewable natural resources**

Competency Builders:
Define non-renewable natural resources
Define the major categories of non-renewable natural resources
Identify the origins of non-renewable natural resources
Describe the value of non-renewable natural resources

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Evaluate the exploitation of natural resources

Competency Builders:

Describe natural events that altered the environment
Describe various methods used to obtain natural resources
Describe effects of obtaining natural resources on the environment
Identify the primary factor for the exploitation of natural resources
Identify the technological advances contributing to the exploitation of natural resources by industry
Identify the technological advances contributing to the exploitation of natural resources by agriculture
Identify the transportation advances contributing to the exploitation of natural resources

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Describe the impact of an increasing human population on the environment**

Competency Builders:

Define doubling time, natural increase, natural decrease, rate of population change, and zero population growth

Interpret a population profile

Identify the results of the increases in the population on the environment

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Explain the consequences of resource use and abuse on the environment**

Competency Builders:

Trace the effects of pollution through a food chain

Differentiate between biodegradable and non biodegradable products

Differentiate between organic farming and farming practices that incorporate the use of biocides and inorganic fertilizers and their comparative effects on the environment

Describe solid-waste disposal methods and groundwater contamination

Identify several causes for the reduction of habitat

Differentiate among the various types of habitat

Explain why preservation of habitat is essential

Define threatened, endangered, introduced and extinct as applied to both plant and animal species

List examples of threatened, endangered, introduced and extinct plant and animal species

Cite causes for the decrease of both plant and animal species

Explain the circumstances contributing to accidental, incidental, and deliberate resource abuse

Identify the results of overuse that occurred from exploitation

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Identify the impact of individuals/organizations on the development of environmental policies and issues**

Competency Builders:

List prominent individuals/organizations involved with environmental issues
Explain current trends in property rights and compensation
Identify the major issues addressed by environmental organizations
Identify major incidents that have resulted in legislation
Match major events in restoration and / or conservation activities to the individuals/organizations responsible
Evaluate results of environmental restoration and conservation efforts
Identify pros and cons of environmental organizations

BIL: Recommended

EDU:	12	AD	AC
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Competency: **Evaluate the effects of research and education on environmental issues**

Competency Builders:

Identify the methods of research used by both public and private agencies in restoration and conservation efforts

Identify the process used in restoration and conservation research

Explain the interrelationship between research and education

Evaluate the outcome of environmental research projects

BIL: Recommended

EDU:	12	AD	AC
	I	P	

Competency: **Explain government's role in environmental restoration and conservation**

Competency Builders:
Describe the effects legislation has had on the environment
Identify federal and state agencies and their roles in restoration and conservation

BIL: Recommended

EDU:	12	AD	AC
		I	

Competency: **Describe the impact and implications of environmental restoration**

Competency Builders:
Explain the importance of environmental restoration
Cite examples of various levels of environmental restoration
Identify the results of restoration efforts
Describe economic issues of restoration projects
Identify non-economic benefits of restoration activities

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Describe the impact and implications of resource conservation**

Competency Builders:
Explain the importance of resource conservation
Cite examples of various levels of resource conservation
Identify the results of conservation efforts
Describe economic issues of conservation efforts
Identify non-economic benefits of conservation activities

BIL: Recommended

EDU:	12	AD	AC
		I	

Competency: **Describe the impact and implications of environmental preservation**

Competency Builders:
Explain the importance of environmental preservation
Cite examples of environmental preservation
Identify the results of preservation efforts
Describe economic issues of preservation efforts
Identify non-economic benefits of preservation activities

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Identify the environmental ethical issues in agriculture**

Competency Builders:

Define organic agriculture

Explain the environmental issues regarding the use of genetically engineered plants in agriculture

Identify agricultural methods/practices that reduce negative effects on the environment

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Identify the role of responsible stewardship in maintaining a healthy environment**

Competency Builders:
Define responsible stewardship
Explain the need for responsible stewardship and environmental accountability
Identify types of environmental accountability
Cite examples of each type of environmental accountability
Cite results stemming from responsible stewardship

Unit: Crop Pest Identification and Management

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Identify pests

Competency Builders:

Explain why identification of the pest is the first step in developing an effective pest control strategy
Define what a pest is
Identify common plant pests and their damages
Explain differences between continuous pests, sporadic pests, and potential pests
Identify fungi and bacteria and their symptoms
Identify symptoms of insects and nematodes
Classify feeding habits and life cycles of insects
Describe life cycles of bacteria and fungi
Identify noxious weeds and vines of crops and specialty plants
Identify insects, diseases, and other pathogens of crops and specialty plants

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Determine when pest control is needed**

Competency Builders:
Identify pest
Determine pest control goal (e.g., prevention, suppression, eradication)
Determine acceptable threshold level of pests

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Explain Integrated Pest Management (IPM)**

Competency Builders:

Explain the theory of Integrated Pest Management

Explain natural controls (e.g., climate, natural enemies, geographic barriers, food and water supplies, shelter)

Explain applied controls (e.g., host resistance, biological control, cultural control, mechanical control, sanitation, and chemical control)

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Plan an Integrated Pest Management control program**

Competency Builders:
Follow general safety precautions
Identify insects, diseases, weeds, and vertebrate pests
Identify pest damage
Calculate area to be covered
Complete certification requirements for prescribed chemical application
Evaluate chemical/cultural/biological control options
Interpret chemical labels and compatibility charts
Identify appropriate control methods
Identify disease-resistant and insect-resistant species
Estimate pest population numbers
Assess degree of damage
Outline when controls are needed
Recognize environmental limitations
Select control option
Take pesticide applicator test
Compute treatment cost
Document chemical application, methods, and results

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Interpret pesticide labeling**

Competency Builders:

Explain pesticide registration including Environmental Protection Agency (EPA), special local needs, and emergency exemptions
Explain "restricted-use pesticide"
Identify certification requirements for use of restricted-use pesticides
Interpret restricted use designation on labels
Interpret ingredient statement on pesticide labels
Interpret identifying information on pesticide labels (e.g., brand name, registration number, establishment number, manufacturer, net contents, type of pesticide, type of formulation)
Interpret precautionary statements (e.g., signal words, symbols, first-aid measures)
Interpret hazard warnings (e.g., acute effects, delayed effects, allergic effects, personal protective equipment required, environmental hazards, physical hazards, and chemical hazards)
Interpret "Directions for use "requirements
Explain importance of following "Directions for use"
Interpret entry statements
Interpret storage and disposal requirements
Explain legal requirements of following label instructions

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate knowledge of pesticide formulations**

Competency Builders:

Explain what a pesticide formulation is
Explain the difference between active ingredients and inert ingredients
Identify the factors to consider when choosing a formulation
Identify the characteristics, advantages, and disadvantages of different types of pesticide formulations
Explain the purpose of adjuvants
List several types of adjuvants
Explain compatability of pesticides

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency **Explain how pesticides can affect the environment**

Competency Builders:

Explain the meaning of the word environment
Distinguish between point-sources and non-point-sources of environmental contamination by pesticides
List ways that careless pesticide handling can lead to point-source pollution
List the environmental factors that should be considered when a pesticide is accidentally or intentionally released into the environment
Gives examples of sensitive areas
Describe factors that influence whether pesticides will move off site in the air
Describe factors that influence whether pesticides will move off site in the water
Describe ways pesticides move off site in or on objects, plants, or animals
Explain how non-target plants and animals can be harmed by a pesticide
Describe the harmful effects that pesticides can have on surfaces
Identify pesticide handling activities that pose a threat to groundwater or endangered species
Explain how pesticide use site determines special actions needed to protect the environment
Identify factors that determine whether pesticides will reach ground water
Explain how to prevent pesticides from reaching groundwater
Explain the importance of the Endangered Species Act when applying pesticides

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Use personal protective equipment when working with pesticides**

Competency Builders:

Explain the concepts of hazard, exposure, and toxicity and how they relate to one another

Identify the four main ways pesticides can contact the human body

List the factors that determine how quickly pesticides will be absorbed through the skin

Explain the main types of acute effects pesticides can cause in humans

Explain the main types of delayed effects pesticides can cause in humans

Explain the main types of allergic effects pesticides can cause in humans

Describe general signs and symptoms of pesticide poisoning and of pesticide irritation

Describe appropriate first-aid for pesticide exposures

Describe your legal responsibility for following personal protective equipment requirements in pesticide labeling

Define chemical resistant

Identify factors that determine how well coveralls will protect the body

Explain the importance of wearing chemical-resistant gloves when handling pesticides

Identify when protective headgear should be worn

Describe appropriate protective headgear

Identify appropriate protective eyewear

Differentiate between dust/mist filtering respirators, vapor-removing respirators, and air-supplying respirators

Describe the special hazards that fumigants pose

Use appropriate personal protective equipment when handling or applying pesticides

Clean personal protective equipment

Maintain personal protective equipment

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Apply pesticides

Competency Builders:
Complete certification requirements for prescribed chemical application
Select pesticides according to product label
Describe how to protect the water source at the mixing site
Select appropriate site for mixing pesticides
Use appropriate personal protective equipment while mixing or loading pesticides
Explain safe handling of pesticide containers
Determine whether selected pesticides can be safely mixed
Explain closed system mixing and loading
Explain enclosed application systems
Explain when pesticide containment systems are appropriate
List the advantages of pesticide containment systems
Identify which types of pesticides must be diluted before application
Explain how to dilute pesticides
Dilute pesticides
Calculate the correct amount of dilute pesticide mixture for the application
Mix pesticides
Explain safety procedures that should be followed each time a pesticide is applied
Explain the importance of applying the correct amount of pesticide
Describe how to determine correct amount of pesticide to apply
Identify ways that application rates may be stated on product label
Calculate the application rate
Explain the importance of calibrating pesticide application equipment
Calibrate equipment
Explain the importance of rechecking calibration equipment frequently
Apply pesticides
Clean pesticide equipment
Describe what to do with rinsates from equipment cleanup
Describe personal cleanup after pesticide handling
Explain the importance of accurate records of pesticide applications

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: Handle pesticides safely

Competency Builders:

List safety precautions for transporting pesticides in a vehicle
Describe how to protect pesticide containers during transport
List actions needed to establish and maintain a safe storage site
Describe what to do when a pesticide containers leaks
Explain what to do with excess pesticides that are still usable
List acceptable ways to dispose of pesticide wastes
Dispose of pesticide containers in compliance with local, state, federal, and EPA regulations
List ways to avoid the need to dispose of empty pesticide containers
Identify the three C's of spill management
Explain the steps to take in each of the three C's
Identify sources of assistance for managing a spill

Unit: Fertilization of Crops

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Practice GPS/GIS technology

Competency Builders:
Practice grid sampling
Interpret sample results
Calculate recommendations
Evaluate yield results
Overlay different surfaces using GPS/GIS
Interpolate differences
Analyze VRT technology
Identify compaction differences
Analyze variable rate planting

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: Identify nutrient requirements of plants

Competency Builders:

Identify groups into which nutrient requirements of plants are divided
Describe the interactions of nutrient availability levels on nutrient toxicity and deficiency
Identify toxicity symptoms caused by excessive manganese and aluminum
Identify major sources of N, P, K, S, Ca and Mg in soils
Identify factors that influence the availability of these nutrients in soils
Explain how soil pH affects nutrient availability
Explain how different types of root systems affect plant nutrient uptake

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Determine fertilization needs**

Competency Builders:
Identify factors influencing fertilizer requirements
Use results of soil analysis to determine soil nutrient levels
Identify symptoms of plant nutrient deficiency
Determine crop nutrient needs
Determine amounts and kinds of nutrients and lime to apply
Evaluate effect of leaching on nutrient availability
Evaluate influence of soil pH on nutrient availability
Analyze manure-sample information
Define meaning of NPK and trace elements on fertilizer information

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Differentiate between organic and inorganic fertilizers

Competency Builders:

Identify sources of inorganic fertilizers
Identify sources of organic fertilizers
Identify the main plant nutrients supplied by inorganic and organic fertilizers
Identify multi nutrient fertilizers
Explain how plants obtain carbon, oxygen, hydrogen, nitrogen, phosphorus, and potassium
Differentiate between a fertilizer grade and a fertilizer analysis
Explain the fertilizer ratio of a 5-10-5 grade
Explain where most of the nitrogen in the soil is derived
Describe the advantages and disadvantages of dry versus liquid fertilizer
Explain the advantages of foliar fertilization
Identify the factors that influence the efficiency of applied fertilizer such as leaching or fixation

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: Describe the application of fertilizers

Competency Builders:

Explain the economic factors to consider in buying fertilizers
Describe the methods of applying solid and liquid fertilizers
Explain the purpose of the different placements of fertilizer in the soil
List the ways fertilizer benefits crop production
Explain how fertilizer applications can decrease crop production
Identify possible losses of each major nutrient and their influences on quality of water in lakes and streams, groundwater quality, and atmospheric quality
Practice calibration of equipment in applying fertilizer
Explain variable rate fertilization using GPS

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Develop fertilization plan

Competency Builders:
Interpret fertilization-rate charts
Select fertilizer analysis
Select fertilizer application method
Estimate costs of lime and fertilizer recommendations
Develop fertilization schedule
Determine amount of lime needed to maintain pH levels
Calculate fertilization rates required for maximum return per dollar

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Fertilize crops**

Competency Builders:
Follow general safety precautions
Follow recommended amounts, timing, and placement of fertilizers
Interpret information on a fertilizer label
Mix fertilizer solutions
Calibrate fertilizer application rates
Transfer liquid fertilizer from nurse tank to applicator
Apply fertilizer
Apply fertilizer using computerized, on-the-go method
Recognize signs of fertilizer injury
Identify safety factors involved in handling NH3
Clean fertilizer equipment
Maintain fertilizer equipment
Handle all types of fertilizers

Unit: Crop Production

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: Explain agricultural concepts

Competency Builders:

Differentiate between seed crops and vegetative crops
Describe the life cycle of a crop plant (e.g., from seed to vegetative stage to reproductive stage to seed)
Explain multiple cropping
Define forage
Explain the purpose of cover crops
Identify uses of tillage
Define conventional tillage
Define conservation tillage
Identify differences between conventional and conservation tillage
Describe cropping systems
Describe dryland farming
Describe organic farming
Compare organic farming to standard production systems
Describe hydroponic crop production
Describe permaculture
Explain crop rotation
Identify equipment used for tilling, seeding, cultivating, harvesting, etc.
Explain "fly-safe date"
Explain "Days-to-Maturity" rating system
Explain GDD (Growing Degree Days) maturity rating system
Explain factors to consider when choosing what crop to produce
Explain factors to consider when selecting seed
Describe procedures for harvesting crops
Describe procedures for storing crops
Explain the use of Global Positioning Systems in agriculture
Explain the use of Geographic Information Systems in agriculture

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Demonstrate a knowledge of crops common to Ohio**

Competency Builders:
Identify small grain crops common to Ohio
Identify corn crops common to Ohio
Identify forage crops common to Ohio
Identify alternative crops common to Ohio
Identify cover crops common to Ohio
Describe the economic importance of various crops
Describe the practices necessary to produce various crops
Identify the major advantages and disadvantages of various crops

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Explain plant nutrition as related to crop production**

Competency builders:
Define green manure crops
Explain the relationship of adequate fertilization to yields
Explain the relationship of tillering in grain crops
Explain the relationship of return on investment in crop production
Describe purpose of inoculation of legume seeds with nitrogen fixing organisms
Explain minimum, optimum, and luxury consumption of soil nutrients by the plant
Compare nutrients in the soil versus what plants get from air and water

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Explain plant fertilization as related to crop production**

Competency Builders:
Identify deficiencies caused by the lack of the minor elements
Differentiate between organic and inorganic fertilizers
Describe the advantages and disadvantages of organic versus inorganic fertilizers
Identify global uses of inorganic and organic fertilizers
Describe the pollution hazards associated with over fertilization
Describe the latest techniques used to dispense only required amounts of fertilizer for crops

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Identify environmental factors affecting crops**

Competency Builders:

List some warm and cool season crops

List optimum growth conditions for different types of plants

Explain how crops may be managed to maximize environmental resources (e.g., establishing crop canopies to intercept 100% of light energy prior to fruiting, planting at a date that ensures sufficient biomass to obtain maximum yield)

Describe the influence of day length on plant growth

Explain how the cycle of the seasons influences plant growth

Identify how planting date, row spacing, and plant population affect crop yield and quality

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Explain weed control of crops**

Competency Builders:

List ways weeds spread
List reasons weeds are harmful
List methods of weed control
Explain mode of action of common herbicides
Explain weed resistance to herbicides
Describe possible applications of genetic engineering and gene splicing to weed control
Explain how herbicides kill weeds
Explain why some herbicides are applied before or after a crop is planted
Explain why weed problems depend on when they occur during growing season of crop
Identify the major weed species and options available for controlling each

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Explain moisture control

Competency Builders:
Define irrigation, mulch, organic matter, runoff, seepage, subsoiling, and tillage
List three methods of moisture control
List the cultural practices used in moisture control (i.e., annually and at planting)
Describe importance of internal and external drainage in soils for crop production
Describe importance of irrigation to crops
Describe the methods of irrigation (e.g., drip, furrow, sprinkler, flood)
Explain the hydrologic cycle
Explain how irrigation causes salinity problems
Explain salt water intrusion in irrigation wells
Explain subsidence caused by removal of irrigation water
Describe methods used to reduce irrigation water loss
Explain the use of tensiometers and moisture meters
Explain permaculture
Explain irrigation scheduling

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Test soil and plant tissues**

Competency Builders:
Take soil samples
Submit prepared soil samples and forms to analysis laboratory
Take plant tissue samples
Submit prepared plant tissue samples and forms to analysis laboratory
Interpret soil analysis results
Interpret plant analysis results
Monitor nutrient levels with infield equipment

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Determine land class capability**

Competency Builders:
Evaluate soil drainage
Identify soil texture and percent organic matter
Identify soil structure and type
Determine slope
Determine soil use capability and suitability
Explain factors to consider when planting on reclaimed land (minesoil)
Follow government regulations and guidelines
Use infrared mapping

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Practice soil and water conservation**

Competency Builders:
Explain soil and water conservation structures and methods
Maintain soil and water conservation structures and methods
Evaluate planting and tilling methods
Identify government programs
Follow guidelines of government programs
Manage residue to reduce erosion

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Develop plan for planting crops**

Competency Builders:
Identify a land use plan
Identify long-range conservation practices
Select crop varieties best suited for land, market and type of farm operation
Determine need for companion crop
Recommend crop rotation plan
Identify crop seeds
Interpret seed tag information
Interpret planting charts on seed bag
Calculate number of bushels of seeds needed
Evaluate stand of forage or winter wheat
Select seed
Determine seeding rate
Determine steps to improve stand
Calculate price per pound of pure live seed
Evaluate alternative crops

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Determine procedures needed to manage crops from planting to harvest**

Competency Builders:
Scout fields
Identify crop problems
Determine cause of crop problems
Develop fertilization plan
Develop plan to control insects and diseases
Develop plan to control weeds

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Manage crops**

Competency Builders:
Fertilize crops
Control insects and diseases
Control weeds
Apply pesticides

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Harvest grain crops**

Competency Builders:
Follow general safety precautions
Determine crop maturity
Calculate crop yields
Estimate harvest loss
Select equipment to reduce harvest loss
Operate equipment
Prioritize harvest areas
Distribute residue
Minimize soil compaction
Evaluate grain quality

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Interpret topographic and soil maps, aerial photographs, and legal descriptions**

Competency Builders:
Interpret legal land descriptions
Interpret map symbols
Interpret map legends
Identify true and magnetic north
Draw profiles using contour lines
Demonstrate knowledge of how to operate a computer-aided mapping program
Complete drawings using a computer-aided mapping system
Measure distances
Identify terrain types
Interpret elevations
Identify direction of water flow
Calculate area
Identify the location of field boundaries
Establish field boundaries
Interpret topical and aerial photographs
Calculate acreage based on field measurements

Unit: Agricultural Business Management and Marketing

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Identify sources of agricultural information and assistance

Competency Builders:

Maintain a file of current technical information from universities, governmental agencies, and commercial companies
Maintain a reference file for periodicals and other publications
Attend seminars and workshops to update skills and knowledge
Use computer networking for up-to-date agricultural information
Identify associations and societies associated with agricultural professions

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Apply business skills and economic principles to the agricultural industry**

Competency Builders:

Explain the basic economic principles in the agricultural industry
Explain the importance of local, state, and federal regulations and required documentation affecting the agricultural industry
Describe the types of agribusiness by organizational structure (e.g., sole proprietorship, partnership, corporation)
Select computer applications
Use computer applications
Analyze data
Determine the point of maximum profit
Determine fixed and variable costs of production
Use the fixed/variable concepts in making business decisions
Determine the resulting change in price of commodities when shifts in supply and demand take place
Describe how to manage inventory and determine selling price
Explain the importance of agribusiness records
Explain the types of insurance needs of an agricultural business

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Follow legal requirements**

Competency Builders:
Identifies government agencies regulating farm operation
Comply with employers' and employees' legal responsibilities
Follow system for government regulation compliance

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Maintain supplies

Competency Builders:
Set minimum and maximum inventory levels
Conduct physical inventories
Maintain computerized inventory records
Purchase supplies
Compare costs and quality of supplies from different sources
Make maximum use of vendor discounts
Calculate shipping charges
Regulate storage facility environment
Clean storage area
Inspect storage area for damage and hazards

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Demonstrate sales skills**

Competency Builders:
Maintain product and service knowledge
Differentiate between product features and product benefits
Examine types of selling techniques
Identify types of customers
Identify customer buying motives and signals
Maintain prospective customer relationship
Follow up purchases and sales
Develop repeat customer contact list
Add customer to annual mailings
Develop a follow-up file

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Provide technical assistance**

Competency Builders:
Provide customer with informative materials
Interpret product labels
Demonstrate product use
Explain safety precautions regarding product use
Outline extent of product guarantee
Address customer complaints

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Demonstrate understanding of marketing principles

Competency Builders:

Define basic marketing terminology (e.g., market, marketing mix, market penetration)
Identify purpose of marketing
Identify marketing activities
Identify elements in the marketing mix (e.g., price, product, promotion, place)
Explain market share
Identify factors that affect market share
Explain margin analysis
Explain market integration
Describe cooperative marketing
Explain methods of pricing farm commodities
Identify governmental regulations affecting the marketing of agricultural products

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Describe marketing strategy**

Competency Builders:
Identify marketing strategies for differing products and services
Differentiate between mass-market and market segmentation approaches
Describe the process of identifying a market for a product or service
Describe the role of margin analysis in developing market strategy
Give examples of product positioning

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Demonstrate a basic knowledge of international agricultural trade**

Competency Builders:

Identify the major U.S. agricultural export markets
Identify major U.S. agricultural export crops
Explain how U.S. agriculture can remain competitive
Identify factors to consider when deciding whether to enter the export market
Explain trade barriers, duties, and tariffs
Identify organizations that can provide assistance in international agricultural trade
Explain the impact of trade agreements such as NAFTA and GATT on agriculture

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: Develop a marketing plan

Competency Builders:
Determine business objectives
Analyze competition
Identify potential buyers
Calculate break even point
Determine pricing goals
Identify factors affecting pricing
Compare pricing strategies
Identify marketing channels
Select marketing channels
Determine most advantageous method of marketing crops
Determine when to market
Identify distribution channels
Develop marketing goals

BIL: Essential

EDU:	12	AD	AC
	I	P	

Competency: **Promote company image**

Competency Builders:
Explain importance of image
Identify factors affecting image, positive and negative
Project company image
Exhibit good personal hygiene
Perform quality work
Follow instructions and uniformity
Keep equipment clean
Follow dress code
Handle customer complaints
Communicate positively with customers
Read company manual
Maintain continuity and uniformity of company logo
Develop customer awareness programs

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: Conduct sale

Competency Builders:
Greet customers
Use appropriate questioning techniques
Use appropriate selling techniques
Identify customer needs, problems and recommendations
Describe services and expectations
Explain extent of guarantee
Access support services
Close sale
Use good telephone skills
Compute taxes

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Prepare estimate**

Competency Builders:
Calculate square footage and cubic yards
Use price list
Estimate total amount of materials needed
Estimate labor requirements
Estimate fixed costs
Estimate profit and loss margins

BIL: Essential

EDU:	12	AD	AC
	P	R	

Competency: **Maintain price lists and catalogs**

Competency Builders:
Compare prices of similar products and services
Outline material and service availability
Keep product and service catalogs current
Keep profit and loss in line

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Price merchandise**

Competency Builders:
Estimate fixed and variable expenses
Calculate markup
Calculate break-even point
Compare pricing strategies
Identify factors affecting pricing
Price merchandise
Prepare merchandise for inventory or display
Use computerized pricing system
Attach price tags

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: **Display merchandise**

Competency Builders:
Design displays
Set up displays
Select items for display
Use props
Identify display areas

Unit: Greenhouse Management

BIL: Recommended

EDU:	12	AD	AC
	I	P	

Competency: **Test soil, water, and plant tissues**

Competency Builders:
Follow general safety precautions
Take soil sample
Prepare soil to be tested
Collect plant tissues to be tested
Determine pH level
Determine soluble salt levels
Take water samples
Interpret results of water test
Interpret results of soil test
Interpret results of plant tissue test
Realize need for professional help

BIL: Essential

EDU:	12	AD	AC
	R	P	

Competency: **Prepare media mixes**

Competency Builders:
Follow general safety precautions
Shred planting media materials
Mix planting media materials
Pasteurize media
Identify media functions
Identify media components
List the requirements of a good growing media for potted plants (e.g., pH, porosity)
Identify the ingredients used to prepare an artificial growing media
Explain the process of soil pasteurization
Identify the limitations of the various growing mediums
Identify the nutrients required for plant growth
Identify economics of mix-your-own vs. commercial mix (e.g., labor, raw materials, equipment)

BIL: Essential

EDU:	12	AD	AC
	R	P	

Competency: **Prepare for propagation**

Competency Builders:

Explain propagation (e.g., sexual, asexual)
Follow general safety precautions
Identify tools and equipment used in greenhouse crop propagation
Explain routine maintenance procedures for greenhouse equipment and facilities (e.g., growth chambers, seeders)
Describe the propagation requirements for the major floriculture crops produced in the local area
Identify major bedding, foliage, flowering, and seed stock used for propagation
List advantages and disadvantages of the different types of greenhouse benches relating to propagation
Grade cuttings for size
Interpret seed germination information
Identify containers
Identify environmental factors of propagation
Select media
Sanitize propagation equipment, areas, and containers
Identify planting depth
Identify propagation problems and solutions (e.g., seed sowing, cutting, timing)
Outline plant scheduling
Explain economics and quality issue of self-propagation and/or purchasing from reputable source
Explain seed germination
Explain use of rooting hormones

BIL: Essential

EDU:	12	AD	AC
	R	P	

Competency: **Manage plant production**

Competency Builders:

Follow general safety precautions
Demonstrate proper water application
Explain the correct quantity of water to apply
Explain the layout of automatic watering systems
Identify factors that would reduce the quality of water
Select the appropriate container for a particular plant or crop
Explain the purpose of growth regulating chemicals
Outline plant scheduling
Sow seeds
Plant bulbs
Force bulbs
Take cuttings
Label plants and cuttings
Prepare growing media for different types of greenhouse crops and use of soil handling equipment
Transplant seedlings and rooted cuttings
Explain the reasons for pinching, spacing, and disbudding specific greenhouse crops
Describe the types and uses of commonly used automatic greenhouse watering systems
Monitor plant growth (e.g., graphical tracking)

BIL: Essential

EDU:	12	AD	AC
	R	P	

Competency: **Fertilize plants in greenhouse operation**

Competency Builders:
Follow general safety precautions
Interpret fertilizer bag labels (e.g., micro and macro nutrients)
Mix fertilizer solutions
Apply liquid fertilizer
Apply dry fertilizer
Identify fertilizer injectors
Use fertilizer injectors
Identify fertilization practices and terminology
Identify symptoms of nutrient deficiency
Determine kind of fertilizer to apply
Interpret manufacturer's fertilization rate charts
Calibrate fertilizer application equipment
Calculate the amount of fertilizer needed for an injector stock solution based on the PPM of nitrogen to be applied and the ratio of the injector
Determine fertilizer applications for various crop and plant growth situations
Identify the major nutrient deficiency symptoms
Explain why and when leaching is necessary

BIL: Essential

EDU:	12	AD	AC
	R	P	

Competency: **Regulate greenhouse environment**

Competency Builders:
Follow general safety precautions
Install shade cloth
Apply glass shading compound
Identify supplemental lighting
Set timers to regulate lighting
Hang lath or saran cloth
Use light meters
Hand irrigate plants
Install irrigation system (e.g., drip, computer irrigation)
Use irrigation system
Identify heating systems (e.g., centralized, localized)
Identify cooling system (e.g., natural ventilation, fan/pad)
Control humidity
Adjust temperatures for plants (e.g., DIF, energy conservation)
Identify carbon dioxide levels
Identify factors influencing plant growth
Identify environmental control system (e.g., computer system)
Explain operation of thermostats and cycle timers
Identify glazing on a greenhouse
Apply mechanical and electrical safety as it applies in greenhouse operation
Control lighting for short and long day sensitive plants
Explain the effects of night and day temperatures on plant growth
Explain light requirements in terms of intensity and duration for plants being grown in a production environment

BIL: Recommended

EDU:	12	AD	AC
	I	R	

Competency: Compare greenhouse structures

Competency Builders:

Follow general safety precautions
Identify life expectancy of structure
Identify space utilization
Identify types of ventilation systems
Identify types of structures
Differentiate among types of greenhouse structures and their layout
List the requirements necessary for good plant growth
Explain the use of cold frames and lath houses in conjunction with the greenhouse
Explain light requirements in terms of intensity and duration for plants being grown in a production environment
Control lighting for short and long day sensitive plants
Describe types of heating and cooling systems used in greenhouse production
Explain the effect of night and day temperatures on plant growth
Explain how various air quality factors are maintained for good plant growth

BIL: Recommended

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Competency: **Perform post harvest care**

Competency Builders:

Define post harvest care
Follow general safety precautions
Explain the procedures involved in planning a greenhouse crop so production will be in line with seasonal demand for the finished product
Explain how potted plants should be packaged and handled during harvesting and shipment
Explain care upon receipt of product
Explain how cut flowers should be handled during harvesting and shipment
Identify the market possibilities in the local area for a given horticulture crop
Develop a crop rotation for a year of greenhouse production
Identify harvest stages
Cut plants/flowers
Count and bunch plants/flowers
Regulate cold storage unit temperature
Explain plant maintenance to preserve plant viability
Identify plant life expectancy
Demonstrate safety practices when harvesting, processing, and shipping plants
Differentiate between a production greenhouse environment and a maintenance home/office environment

BIL: Recommended

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	I	R	

Competency: Maintain nursery and greenhouse equipment/facilities

Competency Builders:

Follow general safety precautions
Clean facility
Replace or repair plastic covering on greenhouse structure
Clean heating and cooling systems
Perform general maintenance by hanging doors
Perform general maintenance by repairing doors
Perform general maintenance by replacing windowpanes
Perform general maintenance by replacing damaged sections of saran or black cloth
Perform general maintenance by replacing damaged support wires for saran or black cloth
Perform general maintenance by constructing benches and frames
Perform general maintenance by repairing benches and frames
Perform general maintenance by shading greenhouse glass
Perform general maintenance by lubricating parts
Perform general maintenance on ventilation systems
Perform general maintenance by adjusting belts on equipment
Perform seasonal equipment pre-check (e.g., heating system)
Inspect assembled equipment for operating defects

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